Grade 3 Target D

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

Content Domain: Operations and Algebraic Thinking
Target D [m]: 3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.
Standards included in Target D: 3.OA.A.8, 3.OA.A.9
Vertical Alignment
Achievement Level Descriptors
Evidence Required
Vocabulary
Response Types
Materials
Attributes
Claim 1: Concepts and Procedures (DOK 2) Question Banks
Claim 2 Problem Solving Question Banks
Claim 3 Communicating Reasoning Question Banks
Claim 4 Modeling and Data Analysis Question Banks

Content Domain: Operations and Algebraic Thinking

Target D [m]: 3.OA.D Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Standards included in Target D: 3.OA.A.8, 3.OA.A.9

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.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.

Vertical Alignment

Related Grade 2 standards

These pages were adapted from open source documents available on the Smarter Balanced Website: http://www.smarterbalanced.org/assessments/development/ August 2016

2.OA.A Represent and solve problems involving addition and subtraction.

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.

Related Grade 4 Standards

4.OA.A Use the four operations with whole numbers to solve problems.

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.

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.

Achievement Level Descriptors

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

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.

Vocabulary
equation, multiply, divide, factor, product, quotient, subtract, add, addend, sum, difference, estimation, estimate, rounding, patterns

Response Types
Equation/Numeric; Multiple Choice, single-correct response; Fillin Table

Materials
addition tables, multiplication tables, number lines

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.

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

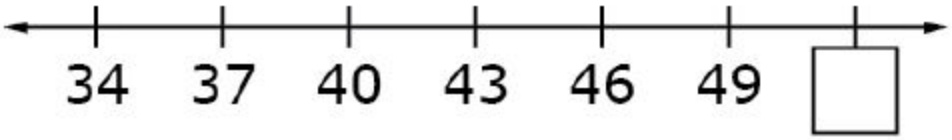
Claim 1 3.OA.A.9 DOK Level 2

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

Question Type 1: The student is presented with an ascending number line within 100 with the last number unknown.

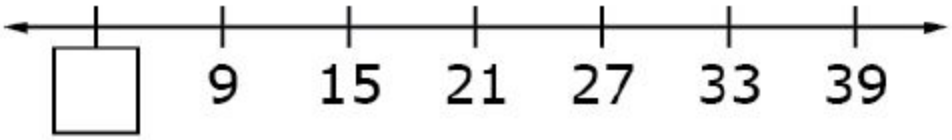
The student is presented with an ascending number line within 100 with the last number unknown.



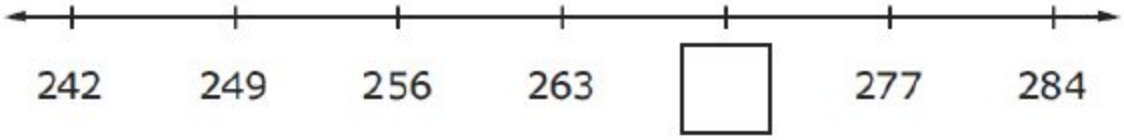
These pages were adapted from open source documents available on the Smarter Balanced Website: http://www.smarterbalanced.org/assessments/development/ August 2016

Question Type 2: 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.

1. Enter the number that belongs in the box on the number line.



2. Enter the number that belongs in the box on the number line.



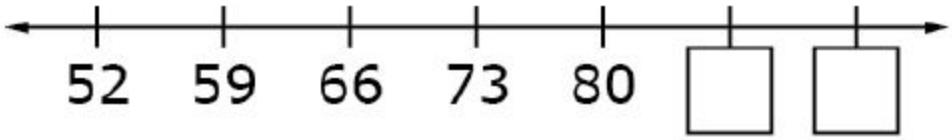
Enter the first unknown number in the first response box. Enter the second unknown number in the second response box.

Rubric: (1 point) The student enters the correct number for the pattern (e.g., 52; 3; 270).

Response Type: Equation/Numeric

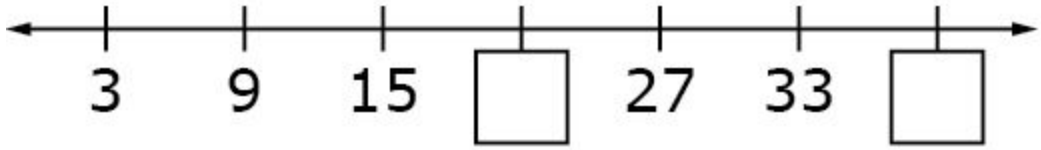
Question Type 3: The student is presented with an ascending number line within 100 with the last two numbers unknown.

Enter the two numbers that belong in the boxes on the number line.



Question Type 4: The student is presented with an ascending number line within 100 with the last number unknown and one number in the middle unknown.

Enter the two numbers that belong in the boxes on the number line.



Rubric: (1 point) The student enters the correct numbers for the pattern (e.g., 87 and 94; 21 and 39).

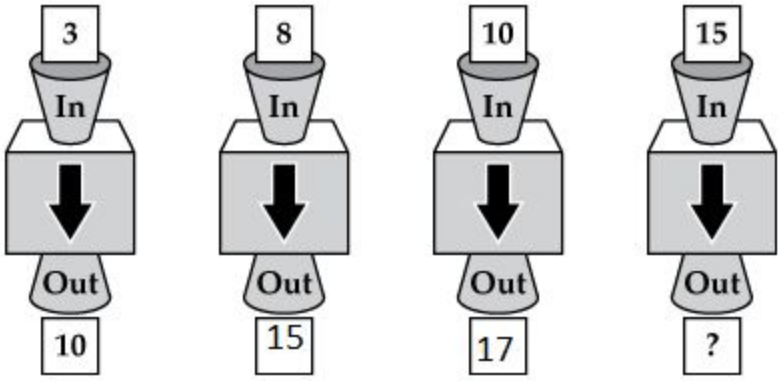
Response Type: Equation/Numeric (2 response boxes)

Question Type 5: 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.

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

Question Type 6: The student is presented with part of a multiplication table. One cell is blank.

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.

Question Type 7: The student is presented with part of a multiplication table. Two cells are blank.

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

Claim 1 3.OA.D DOK Level 1

Solve problems involving the four operations, and identify and explain patterns in arithmetic

Evidence Required

The student solves one-step, real-world contextual problems using addition and subtraction within 1000.

Question Type 1: The student is presented with a one-step, contextual addition problem.

1. There are 392 students in Hall Elementary School and 503 students in Jackson Elementary School.

Enter the total number of students in both schools.

2. There are 425 boys and 510 girls in Franklin Elementary School.

How many more girls than boys are in Franklin Elementary School?

Enter your answer in the response box.

Rubric: (1 point) The student enters the correct number (e.g., 935, 85), or equivalent answer.
Response Type: Equation/Numeric

Claim 2 Problem Solving Question Banks

Claim Descriptors and Targets

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

Example 1

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

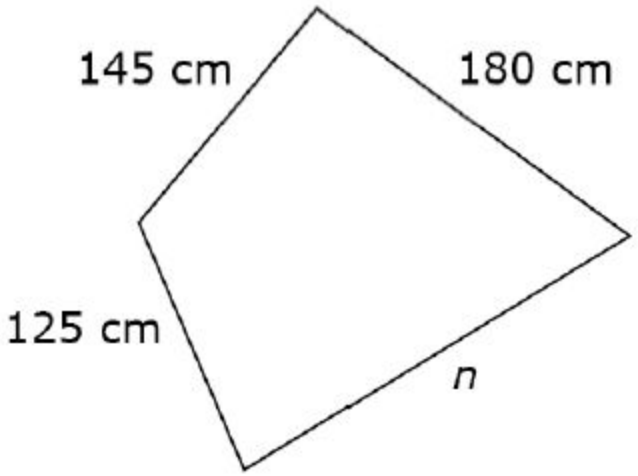
James gets home from school at 3:30 p.m. He completes 2 chores. Then he plays his computer game until 5:00 p.m.

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

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 2

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

<u>Claim 3 Communicating Reasoning Question Banks</u>
Claim Descriptors and Targets

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

Example 1

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.

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

Day	Grams of Food
1	120
2	150
3	*g*

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

These pages were adapted from open source documents available on the Smarter Balanced Website: http://www.smarterbalanced.org/assessments/development/ August 2016

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)

Claim 4 Modeling and Data Analysis Question Banks

Claim Descriptors and Targets

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

Example 1

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 2

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?

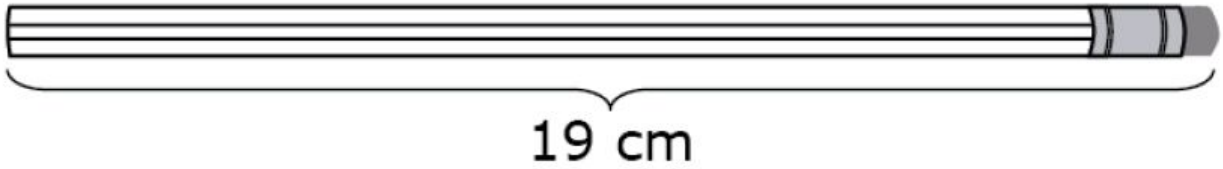
Rubric: (1 point) The student enters the smallest number of bags needed (5).
Response Type: Equation/Numeric

Example 3

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 that 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

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 4

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 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 5

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

These pages were adapted from open source documents available on the Smarter Balanced Website: http://www.smarterbalanced.org/assessments/development/ August 2016