

## **Grade 4 Target E**

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

[Content Domain: Numbers and Operations in Base Ten](#)

[Target E \[m\]: 4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic.](#)

[Standards included in Target E: 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6](#)

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### **Content Domain: Numbers and Operations in Base Ten**

### **Target E [m]: 4.NBT.B Use place value understanding and properties of operations to perform multi-digit arithmetic.**

### **Standards included in Target E: 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6**

**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.

## **Vertical Alignment**

### **Related Grade 3 standards**

3.OA.A Represent and solve problems involving multiplication and division.

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.

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  $8 \times ? = 48$ ,  $5 = \square \div 3$ ,  $6 \times 6 = ?$ .

3.OA.B Understand properties of multiplication and the relationship between multiplication and division.

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  $8 \times 7$  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.,  $9 \times 80$ ,  $5 \times 60$ ) 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.

## **Achievement Level Descriptors**

**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**

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.

**Vocabulary**

sum, difference, product, expression, equation, equal, partial product, quotient, partial quotient, remainder, multiple

**Response Types**

Multiple Choice, single correct response; Equation/Numeric

**Materials**

Non-contextual problems in the four operations, equations, expressions, problems solved or partially solved reflecting different solution strategies

**Attributes**

None

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

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

**Claim 1 4.NBT.B.4 DOK Level 1**

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

**Evidence Required**

The student adds or subtracts whole numbers in non-contextual mathematics problems.

**Question Type 1:** The student is presented with a non-contextual addition problem with two or more whole numbers.

1. Enter the sum.

$$\begin{array}{r} 4325 \\ + 654 \\ \hline \end{array}$$

2. Add together 33, 149, and 67.

Enter the sum in the response box.

Rubric: (1 point) The student enters the correct number (e.g., 4,979; 249).

Response Type: Equation/Numeric

**Question Type 2:** The student is presented with a non-contextual subtraction problem.

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1. Enter the difference.

$$\begin{array}{r} 7529 \\ - 382 \\ \hline \end{array}$$

2. Enter the difference.

$$\begin{array}{r} 4003 \\ - 1486 \\ \hline \end{array}$$

Rubric: (1 point) The student enters the correct number (e.g., 7,147; 2,517).

Response Type: Equation/Numeric

### **Claim 1 4.NBT.B.5 DOK Level 1**

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.

#### **Evidence Required**

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.

**Question Type 1:** The student is presented with a non-contextual multiplication problem.

1. Enter the product.

$$\begin{array}{r} 5327 \\ \times 4 \\ \hline \end{array}$$

2. Multiply 48 and 20

Enter the product in the response box.

Rubric: (1 point) The student multiplies two whole numbers and enters the correct product (e.g., 21,308; 960).

Response Type: Equation/Numeric

**Question Type 2:** The student is presented with a multiplication expression in which properties of operations have been used as strategies for multiplication, with one unknown number.

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

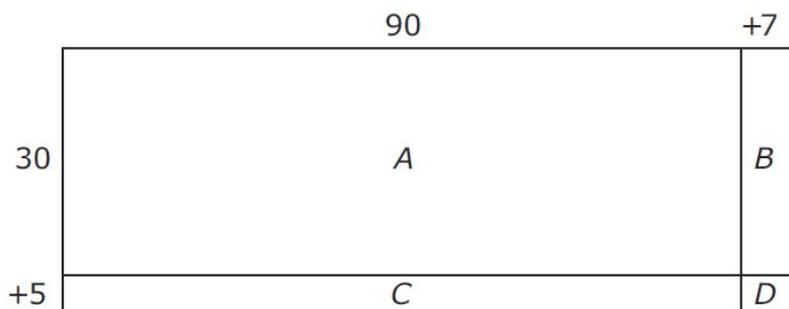
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$$26 \times 74 = (20 + 6) \times (\square + 4)$$

Rubric: (1 point) The student enters the unknown number that makes the equation true (e.g., 70).

Response Type: Equation/Numeric

2. In the area model shown,  $A = 2700$  and  $D = 7$ . What are the values of  $B$  and  $C$ ?



Rubric: (1 point) The student enters correct numbers for  $B$  and  $C$  (e.g.,  $B = 210$ ,  $C = 450$ ).

Response Type: Equation/Numeric (2 response boxes, labeled  $B =$  and  $C =$ , respectively).

**Question Type 3:** 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.

Which expression is equal to  $36 \times 94$ ?

- A.  $(30 \times 90) + (6 \times 4)$
- B.  $(30 + 6) \times (90 + 4)$
- C.  $(30 + 6) \times 94 + (30 + 6) \times 4$
- D.  $(30 \times 90) + (30 \times 6) + (90 \times 6) + (90 \times 4)$

Rubric: (1 point) The student selects a correct expression (e.g., B).

Response Type: Multiple Choice, single correct response

**Question Type 4:** The student is presented with a multiplication problem and four vertically recorded partial solutions.

Which strategy for multiplying 94 and 36 should result in the correct product?

<p>A.</p> $\begin{array}{r} 94 \\ \times 36 \\ \hline 24 \\ 540 \\ 120 \\ + 270 \\ \hline \end{array}$	<p>B.</p> $\begin{array}{r} 94 \\ \times 36 \\ \hline 24 \\ 54 \\ 120 \\ + 2700 \\ \hline \end{array}$	<p>C.</p> $\begin{array}{r} 94 \\ \times 36 \\ \hline 2700 \\ 540 \\ 120 \\ + 240 \\ \hline \end{array}$	<p>D.</p> $\begin{array}{r} 94 \\ \times 36 \\ \hline 2700 \\ 540 \\ 120 \\ + 24 \\ \hline \end{array}$
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Rubric: (1 point) The student selects a correct strategy (e.g., D).

Response Type: Multiple Choice, single correct response

**Claim 1 4.NBT.B.6 DOK Level 1**

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.

**Evidence Required**

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.

**Question Type 1:** 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.)

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

$$2571 \div 3 = \square$$

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

$$120 \times 5 + \square = 603$$

Rubric: (1 point) The student enters the correct unknown number (857; 3).

Response Type: Equation/Numeric

**Question Type 2:** The student is presented with a non-contextual division problem with a box to represent an unknown number.

1. Enter the unknown number to make the equation true.

$$98 \div 5 = (\square \div 5) + (8 \div 5)$$

Rubric: (1 point) The student enters the correct number (e.g., 90).

Response Type: Equation/Numeric

**Question Type 3:** The student is presented with a division equation with a box representing an unknown number.

Select the equation that has the same unknown number as  $90 \div 5 = \square$ .

A.  $5 \times 90 = \square$

B.  $90 \times \square = 5$

C.  $5 \times \square = 90$

D.  $\square \times 90 = 5$

Rubric: (1 point) The student selects the related multiplication equation (e.g., C).

Response Type: Multiple Choice, single correct response

**Question Type 3:** The student is presented with a contextual division problem where the student must identify the whole number quotient and remainder.

1. A teacher has 1247 craft sticks. She divides them equally among 9 students.

How many craft sticks does each student get? Enter your answer in the first response box.

How many craft sticks are left over? Enter your answer in the second response box.

Rubric: (1 point) The student enters the correct numbers in each response box (e.g., 138, 5).

Response Type: Equation/Numeric, two response boxes

### **Claim 2 Problem Solving Questions 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

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

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$$\begin{array}{r}
 50\boxed{\phantom{0}}6 \\
 - \boxed{\phantom{0}}48\boxed{\phantom{0}} \\
 \hline
 16\boxed{\phantom{0}}8
 \end{array}$$

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.

### Example 2

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

### **Claim 3 Communicating Reasoning Question Banks**

#### **[Claim Descriptors and Targets](#)**

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

#### **Example 1**

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

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

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.

#### **Example 2**

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.  $10 \times 10 = 100$

### Example 3

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