MA.4.NSO.2.3

Overarching Standard: ***MA.4.*****NSO.2** *Build an understanding of operations with multi-digit numbers including decimals.*

Benchmark of Focus

MA.4.NSO.2.3: Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency.

Related Benchmark/Horizontal Alignment

- MA.4.AR.1.1
- MA.4.M.1.2
- MA.4.M.2.1
- MA.4.GR.2.1/2.2

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.3.NSO.2.2/2.3/2.4	MA.5.NSO.2.1

Terms from the K-12 Glossary

- Expression
- Equation
- Factor

Purpose and Instructional Strategies

The purpose of this benchmark is for students to become procedurally fluent in using a standard algorithm. Work with standard algorithms began in the procedural reliability stage when students explored a variety of methods and learned to use at least one of those methods accurately and reliably.

- It is important to challenge students to explain the steps they follow when using a standard algorithm (i.e. regrouping, proper recording and placement of digits by place value).

Common Misconceptions or Errors

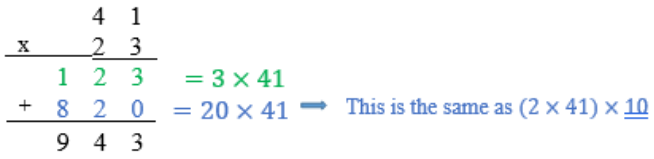
Students that are taught a standard algorithm without any conceptual understanding will often make mistakes. For students to understand a standard algorithm or any other method, they need to be able to explain the process of the method they chose and why it works. This explanation may include pictures, properties of multiplication, decomposition, etc.

- Some students may struggle with this benchmark if they do not have a strong command of basic addition and multiplication facts.

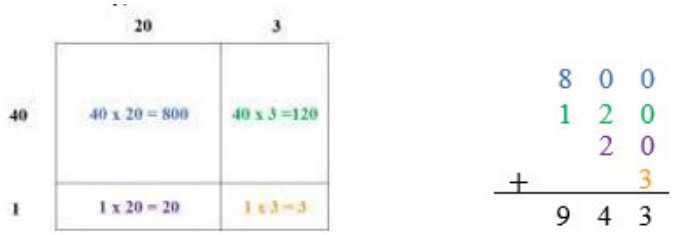
Strategies to Support Tiered Instruction

- Instruction includes explaining mathematical reasoning while using a multiplication algorithm. Instruction also includes determining if an algorithm was used correctly by reviewing the reasonableness of solutions.

- For example, students use an algorithm to determine 41 × 23 and explain their thinking using place value understanding. Explicit instruction includes: "Begin by multiplying 3 *ones* times 1 *one*. This equals 3 *ones*. We will write the 3 *ones* under the line, in the ones place. Next, we will multiply 3 *ones* times 4 *tens*. This equals 12 *tens*. We will write the 12 *tens* under the line in the hundreds and tens place because 12 *tens* is the same as 1 *hundred* and 2 *tens*. This gives us our first partial product of 123. Now we will multiply the 1 *one* by the 2 *tens* from 23. This equals 2 *tens* or 20. We will record 20 below our first partial product of 123. Next, we, we will multiply 2 *tens* times 4 *tens*, which equals 8 *hundreds*. We will write the 8 in the hundreds place of our second partial product. Our second partial product is 820. Finally, we add our partial products to find the product of 943."

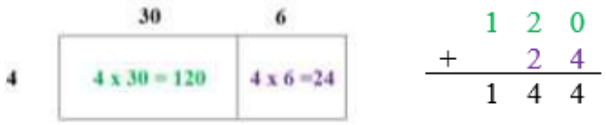


- For example, students determine 41 × 23 using an area model and place value understanding.



- For example, students use an algorithm to determine 4 × 36 and explain their thinking using place value understanding. Instruction includes stating, "Begin by multiplying 4 *ones* times 6 *ones*. This equals 24 *ones* or 2 *tens* and 4 *ones*. We will write the 4 *ones* from 24 under the line, in the ones place. We will write the 2 *tens* from 24 as a 2 above the 3, as a regrouped digit in the tens place. Next, we will multiply 4 *ones* times 3 *tens*. This equals 12 *tens*. We will add the 2 *tens* to the 12 *tens* for a total of 14 *tens*. We will write the 14 *tens* under the line in the hundreds and tens place because 14 *tens* is the same as 1 *hundred* and 4 *tens*. Our product is 144."

- For example, students determine 4 × 36 using an area model and place value understanding.



- Instruction includes the use of known facts to find unknown multiplication facts.
    - For example, if the student does not know the product for 4 × 6 from the previous example, have students use a known fact such as 4 × 5. The known fact of 4 × 5 = 20 can used to find the product of 4 × 6 by adding one more group of 4 to the product of 20 to find the product of 24.

Questions to ask students:

- Ask students why the second partial product in the standard algorithm is always greater than the first when multiplying by a 2-digit number.
    - Sample answer that indicates understanding: The second partial product is always greater because now we are multiplying a number with a value in the tens place, when before we were multiplying a number with only a value in the ones place.

Instructional Tasks

Instructional Task 1

Using the digits 1, 2, 3 and 4, arrange them to create two 2-digit numbers that when multiplied, will yield the greatest product.

Instructional Items

Instructional Item 1

Select the expressions that have a product of 480.

a. 10×48
b. 16×30
c. 24×24
d. 32×15
e. 40×80

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.4.NSO.2.3 Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency. Clarification 1: Instruction focuses on helping a student choose a method they can use reliably. **Also Assesses** MA.4.NSO.2.2 Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability. Clarification 1: Instruction focuses on helping a student choose a method they can use reliably. Clarification 2: Instruction includes the use of models or equations based on place value and the distributive property. **Also Assesses**	Mathematical	Items assessing MA.4.NSO.2.2 must include at least one term having three digits.

MA.4.NSO.2.1 Recall multiplication facts with factors up to 12 and related division facts with automaticity.		

ALD 2	ALD 3	ALD 4	ALD 5
multiplies two whole numbers up to two digits by one digit with procedural reliability. recalls multiplication facts with factors up to 5 and related division facts.	multiplies two whole numbers, one digit by two digits, including using a standard algorithm with procedural fluency. multiplies two whole numbers up to two digits each with procedural reliability. recalls multiplication facts with factors up to 10 and related division facts.	multiplies two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency. multiplies two whole numbers up to three digits by up to two digits with procedural reliability. recalls multiplication facts with factors up to 12 and related division facts with automaticity.	N/A

Additional Resources:
CPALMS Resources

Kahn Academy Video: Connecting the Area Model to the standard algorithm for multiplication https://goo.gl/84RB2X

Resources/Tasks to Support Your Child at Home:
As your child is solving different multiplication problems, have them use a strategy (base ten model, array model, partial products box model, partial products or place value multiplication. Ask questions such as:

- Explain your strategy.
- How does your model relate to the problem?

Task: Provide multiple opportunities for your child to practice:

376 x 8

26 x 28

263 x 37

9,246 x 4