MA.5.NSO.2.1

Overarching Standard: MA.5.NSO.2 *Add, subtract, multiply and divide multi-digit numbers.*

Benchmark of Focus

MA.5.NSO.2.1 Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.

Related Benchmark/Horizontal Alignment

- MA.5.FR.2.2
- MA.5.AR.1.1
- MA.5.M.1.1
- MA.5.GR.3.1/3.2/3.3

Vertical Alignment

Previous Benchmarks
- MA.4.NSO.2.1/2.2

Next Benchmarks
- MA.6.NSO.2.1

Terms from the K-12 Glossary
- Equation
- Expression
- Whole Number

Purpose and Instructional Strategies

The purpose of this benchmark is for students to demonstrate procedural fluency while multiplying multi-digit whole numbers. To demonstrate procedural fluency, students may choosethe standard algorithm that works best for them and demonstrates their procedural fluency. A standard algorithm is a method that is efficient and accurate (MTR.3.1). In Grade 4, students had experience multiplying two-digit by three-digit numbers using a method of their choice with procedural reliability (MA.4.NSO.2.2) and multiplying two-digit by two-digit numbers using a standard algorithm (MA.4.NSO.2.3). In Grade 6, students will multiply and divide multi-digit numbers including decimals with fluency (MA.6.NSO.2.1).

- There is no limit on the number of digits for multiplication in Grade 5.
- When students use a standard algorithm, they should be able to justify why it works conceptually. Teachers can expect students to demonstrate how their algorithm works, for example, by comparing it to another method for multiplication. (MTR.6.1)
- Along with using a standard algorithm, students should estimate reasonable solutions before solving. Estimation helps students anticipate possible answers and evaluate whether their solutions make sense after solving.

- This benchmark supports students as they solve multi-step real-world problems involving combinations of operations with whole numbers (MA.5.AR.1.1).

Common Misconceptions or Errors

- Students can make computational errors while using standard algorithms when they cannot reason why their algorithms work. In addition, they can struggle to determine where or why that computational mistake occurred because they did not estimate reasonable values for intermediate outcomes as well as for the final outcome. During instruction, teachers should expect students to justify their work while using their chosenalgorithms and engage in error analysis activities to connect their understanding to the algorithm.

Questions to ask students:

- Ask a student who estimated and then solved if their solution is reasonable and how they know if it is reasonable or not.

- Ask students why they wrote a zero before multiplying the second partial product (Example: 372 x 46)
    - Sample answer that indicates understanding: Before multiplying the second partial product I write a zero because I'm not multiplying 372 x 4, I'm multiply 372 x 40. The zero is needed to reflect the actual value of the 4.
    - Sample answer that indicates an incomplete understanding or misconception: Before you multiply the second partial product you must write a zero to get the correct answer.

- 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

Maggie has three dogs. She buys a box containing 175 bags of dog food. Each bag weighs 64 ounces.

Part A. What is the total weight of the bags of dog food in ounces?
Part B. Maggie has a storage cart to transport the box that holds up to 750 pounds. Will the storage cart be able to hold the box? Explain.

Instructional Items

Instructional Item 1
What is the product of 1,834 × 23?

Benchmark	Context	Assessment Limits
MA.5.NSO.2.1 Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.	Mathematical	Items should have factors greater than two digits and a product that has six digits.

ALD 2	ALD 3	ALD 4	ALD 5
N/A	multiplies multi-digit whole numbers, four digits by two digits or five digits by two digits, using a standard algorithm.	multiplies multi-digit whole numbers including using a standard algorithm with procedural fluency.	identifies an error and multiplies multi-digit whole numbers including using a standard algorithm with procedural fluency.

Additional Resources:

CPALMS

Khan Academy

Resources/Tasks to Support Your Child at Home:

Multiplying whole numbers game