MA.4.NSO.2.2

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

Benchmark of Focus

MA.4.NSO.2.2: Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.

Benchmark Clarifications

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.

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
- Distributive Property
- Expression
- Equation
- Factor

Purpose and Instructional Strategies

The purpose of this benchmark is for students to choose a reliable method for multiplying 3 digit numbers by 2 digit numbers. It builds on the understanding developed in Grade 3 (MA.3.NSO.2.2/2.3/2.4), builds on automaticity (MA.4.NSO.2.1) and prepares for procedural fluency (MA.4.NSO.2.3 and MA.5.NSO.2.1).

- For instruction, students may use a variety of strategies when multiplying whole numbers and use words and diagrams to explain their thinking (K12.MTR.2.1). Strategies can include using base-ten blocks, area models, partitioning, compensation strategies and a standard algorithm.
- Using place value strategies enables students to develop procedural reliability with multiplication and transfer that understanding to division. Procedural reliability expects students to utilize skills from the exploration stage to develop an accurate, reliable method that aligns with their understanding and learning style.
- The area model shows students how they can use place value strategies and the distributive property to find products with multi-digit factors.

|	20	6
20	400	120
5	100	30

$26 \times 25 = \boxed{}$

$400 + 120 + 100 + 30 = 650$

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.

Strategies to Support Tiered Instruction

- Instruction includes explaining mathematical reasoning while solving multiplication problems. Instruction also includes determining if a method was used correctly by reviewing the reasonableness of solutions.

  - For example, students determine 5 × 137 using an area model and place value understanding.

	100	30	7
5	5 x 100 = 500	5 x 30 = 150	5 x 7 = 35

    ```
        5 0 0
        1 5 0
    +     3 5
    ---------
        6 8 5
    ```
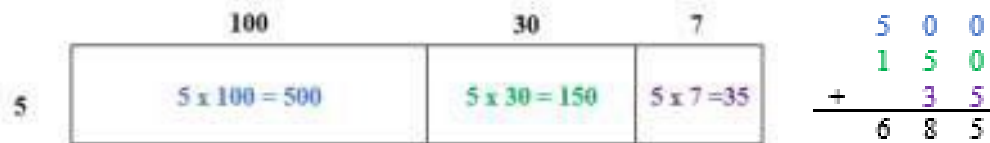
  - For example, students solve 5 × 137 using partitioning and place value understanding.

    $5 \times 100 = 500$
    $5 \times 30 = 150$
    $5 \times 7 = 35$

    650

    685

  - For example, students determine 4 × 43 using base-ten blocks and place value understanding.

    16 *tens* + 12 *ones*
    160 + 12

    160
    + 12
    ----
    (172)

  - For example, students determine 4 × 43 using partitioning and place value understanding.

    $4 \times 40 = 160$
    $4 \times 3 = 12$

    172

Questions to ask students:
- **Looking at your area model for the problem 27 x 6, explain how you decomposed the factors. How did that help you solve the original problem?**

  - Sample answer that indicates understanding: *I broke the factors apart by place value. Then I was able to multiply using partial products, basic facts and place value.*

- **In the problem 34 x 70, why is there a zero in the ones place of the product?**
  - Sample answer that indicates understanding: *The zero is at the end of the product because I'm multiplying by 7 tens, not just 7. My answer would be 10 times greater than if I was multiplying by 7.*
  - Sample answer that indicates an incomplete understanding or a misconception: *I added a zero to the end of my answer because anything times 0 is 0.*

Instructional Tasks
Instructional Task 1
Paul orders tomatoes for The Produce Shop. Each box has 24 tomatoes in it. If Paul orders 32 boxes of tomatoes, how many tomatoes will The Produce Shop have to sell? Use a strategy of your choice to find the number of tomatoes The Produce Shop must sell. Explain your thinking and why your method works.

Instructional Items
Instructional Item 1
    The product of 57 and 92 is:
    a. 627
    b. 4,644
    c. 5,234
    d. 5,244

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.	Mathematical	Items assessing MA.4.NSO.2.2 must include at least one term having three digits.

	Clarification 2: Instruction includes the use of models or equations based on place value and the distributive property. **Also Assesses** 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

Khan Academy: Multiplying with Area Model 16 x 27 https://goo.gl/mbgoKw

Khan Academy: Multiplying with the Distributive Property https://goo.gl/eRo89p

---

Resources/Tasks to Support Your Child at Home:

Video: Solve 2 by 2 digit multiplication problems: using partial products

Khan Academy: More Ways to Multiply https://goo.gl/8Pp6AA

Using a deck of cards, create a 2-digit by 2-digit number. Find the product of the two factors by using an area model and then partial products. Record the new problem as a distributive property equation.