

MA.4.NSO.2.1

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

Benchmark of Focus

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

Related Benchmark/Horizontal Alignment

- MA.4.FR.2.4
- MA.4.AR.2.1

Vertical Alignment

Previous Benchmarks

MA.3.NSO.2.2/2.4

Next Benchmarks

MA.5.NSO.2.1/2.2

Terms from the K-12 Glossary

- Associative Property of Multiplication
- Commutative Property of Multiplication
- Distributive Property
- Factor

Purpose and Instructional Strategies

The purpose of this benchmark is for students to be able to state (recall) their multiplication and division facts in an effortless manner. This work builds on prior multiplication and related division fact strategy work from Grade 3 (MA.3.NSO.2.4). Students also understand that multiplication is commutative and that the Distributive Property can be used to break more complex facts into easier ones.

- To help reach automaticity of multiplication and related division facts, the related concepts should be considered to be foundational. These concepts may be addressed during the exploration or procedural reliability stage (MA.3.NSO.2.4) of the benchmark progression.
 - Multiplication by zeroes and ones
 - Doubles (2s facts)
 - Double and Double Again (4s)
 - Doubling three times (8s)
 - Tens facts (relating to place value, 5×10 is 5 tens or 50)
 - Five facts (half of tens or connect to the analog clock)
 - Skip counting (counting groups of $_$ and knowing how many groups have been counted)
 - Square numbers (the physical and visual representation of these facts makes a square - ex: 3×3)
 - Nines (10 groups less 1 group; e.g., 9×3 is 10 groups of 3 minus 1 group of 3 so $30 - 3 = 27$)
 - Decomposing into known facts (6×7 is a double - 6×6 - plus one more group of 6)
 - Elevens (10 groups and 1 group more; e.g., 11×5 is 10 groups of 5 plus 1 group of 5 so $50 + 5$)

= 55)

- Decomposing using the Distributive property ($12 \times 6 = (10 \times 6) + (2 \times 6) = (60) + (12) = 72$)
- Throughout K-5 instruction, it is not recommended to use timed fact fluency assessments to learn and practice facts.

Common Misconceptions or Errors

- Many students have difficulty with multiplication and related division facts when teachers rely solely on memorization of facts. It is important that strategy work and conceptual understanding is the foundation of instruction for multiplication and division facts.

Strategies to Support Tiered Instruction

- Instruction includes building strategies and conceptual understanding to recall facts to find unknown multiplication fact by using known facts.
 - For example, if students do not know the product for 9×12 have them use a known fact such as 10×12 . The known fact of $10 \times 12 = 120$ can be used to find the product of 9×12 by subtracting one more group of 12 from the product of 120 to find the product of 108.
 - For example, if students do not know the product for 6×7 have them use a known fact such as 5×7 . The known fact of $5 \times 7 = 35$ can be used to find the product of 6×7 by adding one more group of 7 to the product of 35 to find the product of 42.
- Instruction includes building strategies and conceptual understanding to recall facts to find unknown division facts by using known multiplication facts.
 - For example, if students do not know the quotient for $121 \div 11$ have them think about how many groups of 11 equal 121. Have students write the problem as a missing factor problem $_ \times 11 = 121$ to help use multiplication facts to find the quotient. Students can also use known multiplication facts to solve: 10 groups of 11 is 110 and one more group of 11 equals 121 so $121 \div 11$ equals 11.
 - For example, if students do not know the quotient for $45 \div 5$ have them think about how many groups of 5 equal 45. Have students write the problem as a missing factor problem $_ \times 5 = 45$ to help use known multiplication facts to find the quotient.

Questions to ask students:

- **How can switching the order of the factors help you learn the basic facts?**
- Sample answer that indicates understanding: I can switch the order of the factors and always get the same product. This means that I know twice as many facts!
- **How can using the doubling strategy help you learn the basic facts?**
- Sample answer that indicates understanding: It is similar to repeated addition, 4 doubled is 8, any time a number is doubled it is like multiplying by 2. Since 10 is 5 doubled, all of the x10 facts are double the x5 facts and x5 facts are half of the x10 facts.

Instructional Tasks

Instructional Task 1

Explain how the 2s facts, 4s facts, and 8s facts for multiplication are related.

Instructional Items

Instructional Item 1

Select all the true equations.

- a. $11 = 132 \div 11$
- b. $7 \times 12 = 84$
- c. $56 = 7 \times 7$
- d. $49 \div 7 = 7$
- e. $6 \times 11 = 66$

Achievement Level Descriptors

Benchmark		Context	Assessment Limits
<p>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.</p> <p>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.</p> <p>Also Assesses MA.4.NSO.2.1 Recall multiplication facts with factors up to 12 and related division facts with automaticity.</p>		Mathematical	Items assessing MA.4.NSO.2.2 must include at least one term having three digits.
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: <https://www.cpalms.org/PreviewStandard/Preview/15346>

Memorization with Jo Boaler - <http://tinyurl.com/mmp5t34>

YouCubed Article: [Fluency Without Fear: Research Evidence on the Best Way to Learn Math Facts](#)

Origo One Video: Related Multiplication and Division Facts: <https://bit.ly/2LOsVUA>

Smathsmarts Blog Posts:

- [Are Timed Tests Effective Tools for Teaching Fact Fluency?](#)
- [Fact Fluency- What is it?](#)

Resources/Tasks to Support Your Child at Home:

- Look for real-world examples of situations with doubles. For example: tires on a bicycle, sets of eyes, pairs of socks, etc.
- 6 dimes is \$0.60. Explain how you can use this information to find out how many nickels have a value of \$0.60.
- Ask how doubling or other facts can help student with unknown facts.
- Matching Cards - <https://nrich.maths.org/1252>
- YouCubed: Math Cards - <https://www.youcubed.org/tasks/math-cards/>
- Look for real-world examples of multiplication and division problems. Ask your child to identify whether it is multiplication or division and how they know. Always encourage your child to draw models to justify their thinking and to write equations to represent the problems with a symbol for the unknown.
- When your child is presented with division problems, ask them to represent the problem with a division equation and as a multiplication equation with an unknown factor. This will encourage your child to think about how they can use multiplication facts to efficiently solve division problems.