MA.5.NSO.2.4

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

Benchmark of Focus

MA.5.NSO.2.4: Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value.

Example: The quotient of 23 and 0.42 can be estimated as a little bigger than 46 because 0.42 is less than one-half and 23 times 2 is 46.

Benchmark Clarifications
Clarification 1: Estimating quotients builds the foundation for division using a standard algorithm.

Clarification 2: Instruction includes the use of models based on place value and the properties of operations.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.1.1/1.2/1.3/1.4/1.5
- MA.5.FR.2.3
- MA.5.AR.2.2/2.3
- MA.5.M.1.1
- MA.5.M.2.1
- MA.5.GR.2.1

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.4.NSO.2.7	MA.6.NSO.2.1

Terms from the K-12 Glossary
- Equation
- Expression

Purpose and Instructional Strategies

The purpose of this benchmark is for students to explore multiplication division of multi-digit numbers with decimals using estimation, rounding, place value, and exploring the relationship between multiplication and division. This benchmark connects to the work students did in Grade4with addition and subtraction of decimals (MA.4.NSO.2.7). Students

achieve procedural fluency with multiplying and dividing multi-digit numbers with decimals in Grade 6 (MA.6.NSO.2.1)

- Instruction of this benchmark will focus on number sense to help students develop procedural reliability while multiplying and dividing multi-digit numbers with decimals.
- During instruction, students should explore how the products and quotients of whole numbers relate to decimals. For example, if students know the product of 8 x 7 and the quotient of 56 ÷ 4, then they can reason through 0.08 x 7 or 5.6 ÷ 0.4 through place value relationships. Classroom discussions should allow for students to explore these patterns and use them to estimate products and quotients.
- Teachers should connect what students know about place value and fractions. For example, because students know that multiplying a number by one-fourth will result in aproduct that is smaller, multiplying a number by 0.25 (its decimal equivalence) will alsoresult in a smaller product. In division, dividing a number by one-fourth and 0.25 will result in a larger quotient. Continued work in this benchmark will help students to generalize patterns in multiplication and division of whole numbers and fractions (K12.MTR.5.1).
- Models that help students explore the multiplication and division of multi-digit numbers with decimals include base ten representations (e.g., blocks) and place value mats.

Common Misconceptions or Errors

- Students may not understand the reasoning behind the placement of the decimal point inthe product. Modeling and exploring the relationships between place value will help students gain understanding.
- Students can confuse that multiplication always results in a larger product, and that division always results in a smaller quotient. Through classroom discussion, estimation and modeling, classroom work should address this misconception.

Questions to ask students:

- Ask students to describe place value patterns with multiplication.
- Sample answer that indicates understanding: *When I multiply tenths by tenths, the product is in the hundredths. When I multiply tenths by hundredths, the product is in the thousandths.*

- Ask students how estimation helps them to solve multiplication or division problems with decimal values?
- Sample Answer that indicates understanding: Estimation helps determine if my answer is reasonable. For example, if I'm finding the quotient of 42 and .06, I think about 42 divided by 6 =7 and use that as a referent. In this case my divisor is 6 hundredths, so my solution is 70.

- Ask students to find the product of 12.1 and 1.1. First Estimate the product.
- Sample Answer that indicates understanding: *The first factor is about 12 and the second factor is about 1 so the product should be about 12. The exact answer is 13.31.*

- Ask students to find the quotient of 12.1 and 1.1. First estimate the quotient.
- Sample Answer that indicates understanding: *The dividend is about 12 and the divisor is about 1 so the quotient should be about 12. The exact answer is 11.*

Instructional Tasks

Instructional Task 1
What is the same about the products of these expressions? What is different? Explain.

$$14 \times 5 \qquad 0.14 \times 0.05$$

Instructional Task 2
What is the same about the quotients of these expressions? What is different? Explain.

$$50 \div 25 \qquad 50 \div 0.25$$

Instructional Task 3
How can you use $2 \times 12 = 24$ to help you find the product of 2×1.2? Explain.

Instructional Items

Instructional Item 1
Raul reasons that the product of 82×0.56 will be greater than 41 and less than 82. Explain whether or not his conclusion is reasonable.

Benchmark	Context	Assessment Limits
MA.5.NSO.2.5 Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value. Example: The quotient of 23 and 0.42 can be estimated as a little bigger than 46 because 0.42 is less than one-half and 23 times 2 is 46. Clarification 1: Instruction focuses on the place value of the digit when multiplying or dividing. **Also Assesses** MA.5.NSO.2.4 Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability. Example: The number 12.3 divided by 0.01 can be thought of as $? \times 0.01 = 12.3$ to determine the quotient is 1,230.	Mathematical	N/A

	Clarification 1: Estimating quotients builds the foundation for division using a standard algorithm. Clarification 2: Instruction includes the use of models based on place value and the properties of operations.			
ALD 2	**ALD 3**	**ALD 4**	**ALD 5**	
multiplies and divides multi-digit numbers with decimals to the tenths using models based on place value and the properties of operations. multiplies and divides a multi-digit whole number by one-tenth.	multiplies and divides multi-digit numbers with decimals to the hundredths using models based on place value and the properties of operations. multiplies and divides a multi-digit number with decimals to the tenths by one-tenth	explores the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding, and place value. multiplies and divides a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.	multiplies and divides multi-digit numbers with decimals to the hundredths using estimation, rounding, and place value. identifies an error and multiplies and divides a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.	

Additional Resources:

CPALMS

Khan Academy Multiplication of Multi Digit Numbers with Decimals

Khan Academy Division of Multi Digit Number with Decimals

Learnzillion multiplying with decimals

Khan Academy Round Decimals to the nearest tenth

Resources/Tasks to Support Your Child at Home:

Dividing Decimal Games

Multiplying Decimal Games