

MA.5.NSO.2.5

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

Benchmark of Focus

MA.5.NSO.2.5 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.

Benchmark Clarifications:

Clarification 1: Instruction focuses on the place value of the digit when multiplying or dividing.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.1.1/1.2/1.3/1.4
- 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

- MA.4.NSO.2.6

Next Benchmarks

- MA.6.NSO.2.1

Terms from the K-12 Glossary

- Equation
- Expression

Purpose and Instructional Strategies

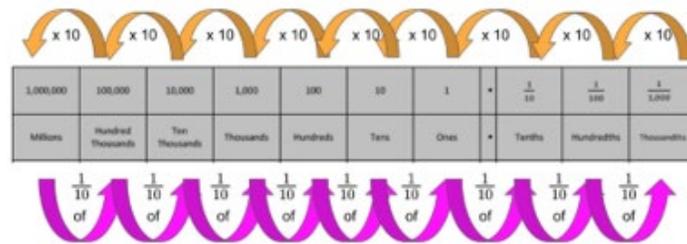
The purpose of this benchmark is for students to multiply multi-digit numbers with decimals to the tenths by .1 and by .01 with procedural reliability. Procedural reliability refers to the ability for students to develop an accurate, reliable method that aligns with a student's understanding and learning style. Fluency of multiplying and dividing multi-digit whole numbers with decimals is not expected until Grade 6 (MA.6.NSO.2.1).

- When multiplying and dividing, students should continue to use the number sense strategies built in MA.5.NSO.2.4 (estimation, rounding, exploring place value relationships). Using these strategies will help students predict reasonable solutions and determine whether their solutions make sense after solving.
- During instruction, students should see the relationship between multiplying and

dividing multi-digit numbers with decimals to multiplying and dividing by whole numbers. Students extend their understanding to generalize patterns that exist when multiplying or dividing by 10 or 100 (MTR.5.1).

- Instruction may include the language that the “digits shift” relative to the position of the decimal point as long as there is an accompanying explanation. An instructional strategy that helps students see this is by putting digits on sticky notes or cards and showing how the values shift (or the decimal point moves) when multiplying by a power of ten. For example, a teacher could show one card with a 3 and another with a 5 and place them on the left and right of a decimal point on a blank place value chart. The teacher could then ask students to multiply by ten and shift both digits one place left to show the equation $3.5 \times 10 = 35$. They could ask students to multiply by $\frac{1}{10}$ and show that $3.5 \times \frac{1}{10} =$

0.35. Instruction may also include using the language “moving the decimal point” as long as there is an explanation about what happens to a number when multiplying and dividing by 0.1 and 0.01. Moving the decimal point does not change its meaning; it always indicates the transition from the ones to the tenths place. From either point of view, when the change is made it is important to emphasize the digits have new place values. (MTR.2.1, MTR.4.1, MTR.5.1).



Common Misconceptions or Errors

- 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.

Strategies to Support Tiered Instruction

- Instruction includes the use of a place value chart to demonstrate how the value of a digit changes if the digit moves one place to the left or right. Instruction includes using place value understanding to make the connections between $\frac{1}{10}$ of, ten times less and dividing by 10. Also, the place value chart can be used to demonstrate that the decimal point marks the transition between the ones place and the tenths place.
 - For example, students multiply 4 by 10, then record 4 and the product of 40 in a place value chart. This process is repeated by multiplying 40 by 10. The teacher asks students to explain what happens to the digit 4 each time it is multiplied by 10. Next, the teacher explains that multiplying by $\frac{1}{10}$ is the same as dividing by 10.

Students multiply 400 by $\frac{1}{10}$ and record the product in their place value chart. The process is repeated, multiplying 40 and 4 by $\frac{1}{10}$. Students explain how the value of the 4 changed when being multiplied by 10 and $\frac{1}{10}$.

hundreds	tens	ones	tenths	hundredths	thousandths
		4			
	$\times 10$	40			
$\times 10$	400	0			
	$\times \frac{1}{10}$	40			
		400			
	$\times \frac{1}{10}$	40			
		400			
			$\times \frac{1}{10}$	4	

- Instruction includes opportunities to use models such as place value disks to demonstrate how the value of a digit changes if the digit moves one place to the left or right. A place value chart can be used with the models to support place value understanding and demonstrate that the decimal point marks the transition between the ones place and the tenths place. Instruction includes using place value understanding to make connections between $\frac{1}{10}$ of, ten times less and dividing by 10.
 - For example, the teacher uses a familiar context such as money, asking students to explain the value of each digit in \$33.33. Then, students represent 33.33 in a place value chart using place value disks. Students compare the value of the whole numbers, (3 dollars and 30 dollars), then move to comparing 0.3 and 0.03 (30 cents and 3 cents). The teacher asks, "How does the value of the three in the hundredths place compare to the value of the three in the tenths place?" and explains that the three in the hundredths place is $\frac{1}{10}$ the value of the three in the tenths place and that multiplying by $\frac{1}{10}$ is the same as dividing by 10.

tens	ones	tenths	hundredths
			

Questions to ask students:

Explain how $3.5 \times 10 = 35$.

- Sample answer that indicates understanding: When I multiply by 10 the decimal point moves one place to the right therefore 5 tenths shifts to 5 ones which yields the product 35.*

Explain how $\frac{1}{10} \times 15 = 1.5$

- *Sample answer that indicated understanding: I'm decomposing the factor 15 into 10 equal size groups so there are 1.5 in each group. I know that $1 \times 15 = 15$ one tenth is less than 1. I tenth of 15 shifts the digit 5 from the ones place to the tenths place to yield the product 1.5.*

Instructional Tasks

Instructional Task 1

Part A. What is $\frac{1}{10}$ times 15?

Part B. How many dimes are in \$1.50?

Part C. Write an expression to represent how many dimes are in \$1.50.

Instructional Items

Instructional Item 1

Which compares the products of 7.8×0.1 and 7.8×10 correctly?

- The product of 7.8×0.1 is 100 times less than the product of 7.8×10 .
- The product of 7.8×0.1 is 10 times less than the product of 7.8×10 .
- The product of 7.8×0.1 is 100 times more than the product of 7.8×10 .
- The product of 7.8×0.1 is 10 times more than the product of 7.8×10 .
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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. 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.	Mathematical	N/A

ALD 2	ALD 3	ALD 4	ALD 5
<p>multiplies and divides multi-digit numbers with decimals to the tenths using models based on place value and the properties of operations.</p> <p>multiplies and divides a multi-digit whole number by one-tenth.</p>	<p>multiplies and divides multi-digit numbers with decimals to the hundredths using models based on place value and the properties of operations.</p> <p>multiplies and divides a multi-digit number with decimals to the tenths by one-tenth</p>	<p>explores the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding, and place value.</p> <p>multiplies and divides a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.</p>	<p>multiplies and divides multi-digit numbers with decimals to the hundredths using estimation, rounding, and place value.</p> <p>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.</p>

Additional Resources:

[CPALMS](#)

Resources/Tasks to Support Your Child at Home:

[Multiply a multi-digit number with decimals to the tenths by one-tenth and one-hundredth game](#)

[Divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth game](#)