MA.5.NSO.1.3

Overarching Standard: MA.5.NSO.1 *Understand the place value of multi-digit numbers with decimals to thethousandths place.*

Benchmark of Focus

MA.5.NSO.1.3 Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings andexpressions or equations.

Example: The number 20.107 can be expressed as 2 $tens$ + 1 $tenth$ + 7 $thousandths$ or as

20 $ones$ + 107 $thousandths$.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.2.4/2.5
- MA.5.AR.2.1/2.2/2.3
- MA.5. M.2.1

Vertical Alignment

Previous Benchmarks

- MA.4.FR.2.1

Next Benchmarks

- MA.6.NSO.3.2

Purpose and Instructional Strategies

The purpose of this benchmark is for students to use place value relationships to compose and decompose multi-digit numbers with decimals. While students have composed and decomposedwhole numbers in Grade 3 (MA.3.NSO.1.2) and fractions in Grade 4 (MA.4.FR.2.1), naming multi-digit decimals in flexible ways in Grade 5 helps students with decimal comparisons and operations (addition, subtraction, multiplication, and division). Flexible representations of multi-digit numbers with decimals also reinforces the understanding of how the value of digits changeif they move one or more places left or right (MA.5.NSO.1.1). Composing and decomposing numbers also helps build the foundation for further work with the distributive property in Grade 6 (MA.6.NSO.3.2).

- Instruction may include multiple representations using base ten models (MTR.2.1). During instruction, teachers should emphasize that the value of a base ten block (or another concrete model) is flexible (e.g., one flat could be 1 ten, one, tenth, hundredth, and so forth). Using base ten models flexibly helps students think about how numbers canbe composed and decomposed in different ways. For example, the image below shows 2.1. This representation shows that 2.1 can also be composed as 21 tenths or 210 hundredths. Thinking about 2.1 as 210 hundredths may help subtracting 2.1 – 0.04 easierfor students because they can think about the expression as 210 hundredths minus 4 hundredths, or 206 hundredths.

- Representing multi-digit numbers with decimals flexibly can help students reason through multiplication and division as well. For example, students may prefer to multiply
  1.2 × 4 as 12 tenths × 4 to use more familiar numbers. (MTR.2.1, MTR.5.1)

- Students should name their representations in different forms (e.g., word, expanded) during classroom discussion. While students are representing multi-digit numbers with decimals in different ways, teachers should invite all answers and have students comparethem. (MTR.4.1)

Common Misconceptions or Errors

Students may assume that the value of base ten blocks are fixed based on their previous experiences with whole numbers (e.g., units are ones, rods are tens, flats are hundreds). During instruction, teachers should name a base ten block for each example so students can relate the other blocks. (For example, “Show 2.4. Allow 1 rod to represent 1 tenth.”)

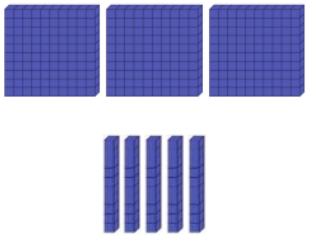
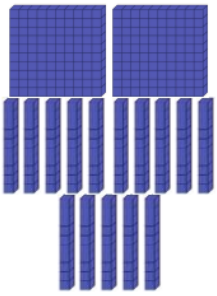
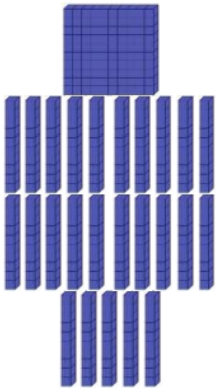
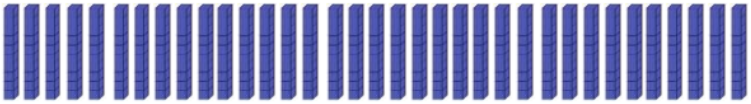
Strategies to Support Tiered Instruction

- Instruction includes opportunities to decompose multi-digit numbers with decimals to the hundredths in multiple ways. Instruction includes the use of base-ten blocks to represent decimals where one flat represents one whole, one rod represents one tenth and one unit represents one hundredth. During instruction, the teacher names a base ten block for each example, so students relate the other blocks. A chart can be used to organize students’ thinking. The teacher asks students to identify the different ways to name the values (grouping the hundredths into tenths and the tenths into the ones, e.g., 2 ones and 34 hundredths or 20 tenths and 34 hundredths, etc.)

- For example, decompose 2.34 in multiple ways using ones, tenths and hundredths.

2.34			
	Example 1	**Example 2**	**Example 3**
Ones and tenths	Not applicable for this example		
Ones and hundredths	2 *ones* + 34 *hundredths*		
Ones, tenths and hundredths	2 *ones* + 3 *tenths* + 4 *hundredths*	1 *one* + 13 *tenths* + 4 *hundredths*	2 *ones* + 2 *tenths* + 14 *hundredths*
Tenths and hundredths	23 *tenths* + 4 *hundredths*	22 *tenths* + 14 *hundredths*	20 *tenths* + 34 *hundredths*
Hundredths only	*234 hundredths*		

- For example, show 3.5. Allow one rod to represent one-tenth. Then, decompose 3.5 in multiply ways using ones, tenths, and hundredths.

3.5			
	Example 1	**Example 2**	**Example 3**
Ones and tenths	3 *ones* + 5 *tenths* 	2 *ones* + 15 *tenths* 	1 *ones* + 25 *tenths* 
Tenths only	35 *tenths* 		

Questions to ask students:

How many tenths are in 2.1?

- *I know that 2 wholes is equal to 20 tenths plus 1 tenth = 21 tenths*

How many hundredths are in 3.56?

- *I know that 3 wholes is equal to 300 hundredths, 5 tenths= 50 hundredths and 5 hundredths for a total of 356 hundredths.*

Draw a model to prove that 1.75 hundredths is equivalent to 17 tenths and five hundredths.

- *Sample drawing that shows a base ten model decomposing 1 whole into 10 tenths plus 7 tenths and 5 hundredths so I have a total of 17 tenths and five hundredths.*

Instructional Tasks

Instructional Task 1

Using base ten blocks, show 1.36 in two different ways. Allow one flat to represent 1 whole.

Instructional Task 2

How many tenths are equivalent to 13.2? How do you know?

Instructional Items

Instructional Item 1

Select all the ways to name 14.09.

a. 1,409 $hundredths$
b. 1 ten + 409 $hundredths$
c. 1 ten + 4 $ones$ + 9 $tenths$
d. 140 $tenths$ + 9 $hundredths$
e. 1,409 $tenths$

Achievement Level Descriptors:

Benchmark	Context	Assessment Limits
MA.NSO.1.3 Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations. Example: The number 20.107 can be expressed as 2 tens + 1 tenth + 7 thousandths or as 20 + 107 thousandths.	Mathematical	Numbers will have a maximum of six significant digits.

ALD 2	ALD 3	ALD 4	ALD 5
composes and decomposes multi-digit numbers with decimals to the tenths in multiple ways using the values of the digits in each place; demonstrates the compositions or decompositions using objects and expressions or equations.	composes and decomposes multi-digit numbers with decimals to the hundredths in multiple ways using the values of the digits in each place; demonstrates the compositions or decompositions using objects and expressions or equations.	composes and decomposes multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place; demonstrates the compositions or decompositions using objects, drawings, and expressions or equations.	identifies an error and composes and decomposes multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place.

Additional Resource(s):

CPALMS

Resources/Tasks to Support Your Child at Home:

You and your child were arguing about the decomposition of 2 numbers. You thought 1.8 tenths was equal to 18 ones and your child thought 1.8 tenths was equal to 18 tenths. Who is correct? How do you know?