MA.5.NSO.2.3

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

Benchmark of Focus

MA.5.NSO.2.3: Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.1.5
- MA.5.AR.2.1/2.2/2.3
- MA.5.M.2.1
- MA.5.GR.2.1

Vertical Alignment

Previous Benchmarks

- MA.4.NSO.2.6/2.7

Next Benchmarks

- MA.6.NSO.2.3

Terms from the K-12 Glossary

- Equation
- Expression

Purpose and Instructional Strategies

The purpose of this benchmark is for students to add and subtract multi-digit numbers with decimals to the thousandths with procedural fluency. In Grade 4 (MA.4.NSO.2.7), students explored the addition and subtraction of multi-digit numbers with decimals to hundredths usingmoney and manipulatives. In Grade 6, students add and subtract positive fractions with procedural fluency.

- To demonstrate procedural fluency, students may choose the standard algorithm

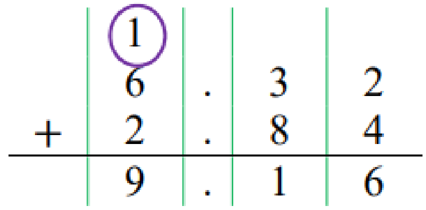
  that works best for them and demonstrates their procedural fluency. A standard algorithmis a method that is efficient and accurate. (MTR.3.1)
- When students use a standard algorithm, they should be able to justify why it works conceptually. Teachers can expect students to demonstrate how their algorithm works, forexample, by comparing it to another method for addition and subtraction. (MTR.6.1)
- Along with using a standard algorithm, students should estimate reasonable solutions before solving. Estimation helps students anticipate possible answers and evaluate whether their solutions make sense after solving.

Common Misconceptions or Errors

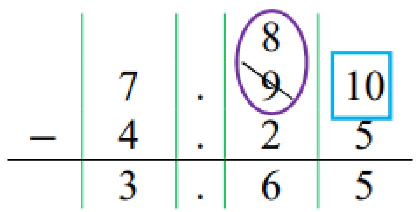
- Students can make computational errors while using standard algorithms when they cannot reason why their algorithms work. In addition, they can struggle to determine where or why that computational mistake occurred because they did not estimate reasonable values for intermediate outcomes as well as for the final outcome. During instruction, teachers should expect students to justify their work while using their chosenalgorithms and engage in error analysis activities to connect their understanding to the algorithm.

Strategies to Support Tiered Instruction

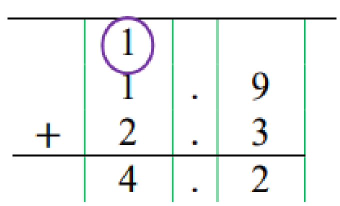
- Instruction includes estimating reasonable values for sums and differences when adding and subtracting decimals to the hundredths.
    - For example, students make reasonable estimates for the sum of 6.32 + 2.84. Instruction includes stating, “Before using an algorithm, we will estimate the sum to make sure that we are using the algorithm correctly and our answer is reasonable. I will use my understanding of rounding decimals to estimate my sum. The addend of 6.32 rounds to 6 when rounded to the nearest whole number and the addend 2.84 rounds to 3 when rounded to the nearest whole number. A reasonable estimate for my sum would be 9 because 6 + 3 = 9.”
    - For example, students make reasonable estimates for the difference of 7.9 − 4.25. Instruction includes stating, “Before using an algorithm, we will estimate the difference to make sure that we are using the algorithm correctly and our answer is reasonable. I will use my understanding of rounding decimals to estimate my difference. The minuend of 7.9 rounds to 8 when rounded to the nearest whole number and the subtrahend 4.25 rounds to 4 when rounded to the nearest whole number. A reasonable estimate for my difference would be 4 because 8 − 4 = 4.”
- Instruction includes explaining and justifying mathematical reasoning while using an algorithm to add and subtract decimals to the hundredths. Instruction also includes determining if an algorithm was used correctly by analyzing any errors made and reviewing the reasonableness of solutions.
    - For example, students use a standard algorithm to determine 6.32 + 2.84 and explain their thinking using a place value understanding. Instruction includes stating, “Begin by lining up the decimal points and place values for each addend. Next, add in hundredths place. 2 *hundredths plus* 4 *hundredths are* 6 *hundredths*. Because the total number of *hundredths* is less than 10 *hundredths* it is not necessary to regroup. Next, add in the tenths place. 3 *tenths plus* 8 *tenths are* 11 *tenths*. Because I have more than 10 *tenths* it is necessary to regroup the 10 *tenths* to make one whole. After composing a group of 10 tenths there is 1 tenth remaining. Finally, add 6 *ones* plus 2 *ones* and the 1 whole that was regrouped from the tenths place. The sum is 9.16. Our sum of 9.16 is close to our estimate of 9, this helps us determine that our answer is reasonable.”



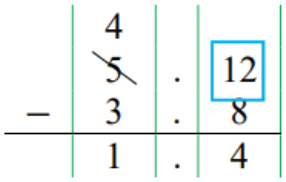
- For example, students use a standard algorithm to determine 7.9 – 4.25 and explain their thinking using place value understanding. The teacher reminds students that 7.9 is equivalent to 7.90 and uses a decimal grid to show the equivalency of 0.9 and 0.90 if needed. Instruction includes stating, “Begin by lining up the decimal points and place values. Next, subtract 4.25 starting in the *hundredths* place. There are not enough *hundredths* to subtract 5 *hundredths* from 0 *hundredths*. It is necessary to decompose one tenth into 10 *hundredths*. Now there are 10 *hundredths*, and there is enough to subtract 5 *hundredths*. 10 *hundredths* – 5 *hundredths* = 5 *hundredths*. Then, subtract the *tenths*: 8 *tenths* – 2 *tenths* = 6 *tenths*. Finally, subtract the *ones*: 7 *ones* – 4 *ones* = 3 *ones*. The difference is 3.65. Our difference of 3.65 is close to our estimate of 4, this helps us determine that our answer is reasonable.”

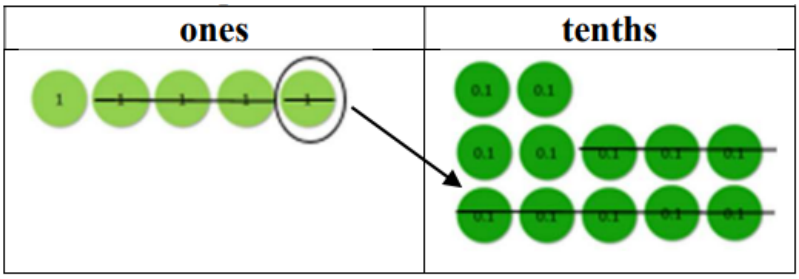


- For example, students use a standard algorithm to determine 1.9 + 2.3 and explain their thinking using a place value understanding. Instruction includes stating, “Begin by lining up the decimal points and place values for each addend. Next, add in *tenths* place. 9 *tenths plus* 3 *tenths are* 12 *tenths*. Because I have more than 10 *tenths* it is necessary to regroup the 10 *tenths* to make one whole. After composing a group of 10 *tenths* there are 2 *tenths* remaining. Finally, add 1 *one* plus 2 *ones* and the 1 whole that was regrouped from the *tenths* place. The sum is 4.2. Our sum of 4.2 is close to our estimate of 4, this helps us determine that our answer is reasonable.”



- For example, students use a standard algorithm to determine 5.2 − 3.8 and explain their thinking using place value disks and their understanding of place value. Instruction includes stating, "Begin by lining up the decimal points and place values. Next, subtract 3.8 starting in the *tenths* place. There are not enough *tenths* to subtract 8 *tenths* from 2 *tenths*. It is necessary to decompose one whole into 10 *tenths*. Now there are a total of 12 *tenths*, and there are enough to subtract 8 *tenths*. 12 *tenths* − 8 *tenths* = 4 *tenths*. Finally, subtract the *ones*: 4 *ones* − 3 *ones* = 1 *one*. The difference is 1.4. Our difference of 1.4 is close to our estimate of 1, this helps us determine that our answer is reasonable."





- Instruction includes the use of place value columns to support place value understanding when using an algorithm to add and subtract decimals.

Questions to ask students:

Ask students how base ten blocks help when adding/subtracting decimals.

- Sample answer that indicates understanding: *When I build decimal values with base ten blocks it helps me to see that I need ten of any place value position to regroup whether I'm adding or subtracting. For example, ten tenths to make 1 whole.*

Ask a student that is connecting the standard algorithm for addition/subtraction of whole numbers to work with decimals why it is important that they line up the place values of the digits.

- Sample answer that indicates understanding: *I must line up the place values because tenths need to be added to tenths, hundredths with hundredths, ones with ones, etc.*
- Sample answer that indicates an incomplete understanding or misconception: *It is the first step to line up the decimal point.*

Ask a student to find the difference of 38.605 and 27.947.

- Sample answer that indicates understanding: *the difference is 10.658, I had to regroup in the hundredths place, tenths place and the ones place in order to find the difference.*

Ask a student to find the sum of 38.605 and 27.947.

- Sample answer that indicates understanding: *the sum is 66.552, I had to regroup in the thousandths place, tenths place and the ones place in order to find the sum.*

Instructional Tasks

Instructional Task 1

Use a standard algorithm to find the difference of eight hundred two and forty-six thousandths and three hundred and nine tenths. Explain how you use your algorithm to subtract.

Instructional Items

Instructional Item 1

Find the sum and difference of 8.72 and 3.032.

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.5.NSO.2.3 Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.	Mathematical	Items must contain at least one multi-digit number with a decimal to the thousandths.

ALD 2	ALD 3	ALD 4	ALD 5
N/A	adds and subtracts multi-digit numbers with decimals to the hundredths including using a standard algorithm.	adds and subtracts multi-digit numbers with decimals to the thousandths, using a standard algorithm with procedural fluency.	identifies an error and adds and subtracts multi-digit numbers with decimals to the thousandths, using a standard algorithm with procedural fluency.

Additional Resources:

CPALMS

Khan Academy Subtracting Whole Numbers with Decimals

Khan Academy Adding Whole Numbers with Decimals

Resources/Tasks to Support Your Child at Home:

Adding Decimal Games

Subtracting Decimal Games