MA.3.NSO.2.1

Overarching Standard: **MA.3.NSO.2** *Add and subtract multi-digit whole numbers. Build an understanding of multiplication and division operations*

Benchmark of Focus

MA.3.NSO.2.1: Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency

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Related Benchmark/Horizontal Alignment

- MA.3.NSO.1.4
- MA.3.AR.1.2
- MA.3.M.1.2

Vertical Alignment

Previous Benchmarks

- MA.2.NSO.2.1
- MA.2.NSO.2.2
- MA.2.NSO.2.3
- MA.2.NSO.2.4

Next Benchmarks

- MA.4.NSO.2.7

Terms from the K-12 Glossary

- expression
- equation
- whole number

Purpose and Instructional Strategies

The purpose of this benchmark is for students to add and subtract multi-digit whole numbers with procedural fluency. Students use skills from the procedural reliability stage in Grade 2 to become fluent with efficient and accurate procedures, including standard algorithms for addition and subtraction.

- A standard algorithm is defined as any efficient and accurate procedure that allows students to add and subtract whole numbers. Students' choices of standard algorithms for addition and subtraction do not need to be the same (MTR.5.1).
- Students should be able to justify their use of a standard algorithm for adding and subtracting by explaining the steps mathematically. Each student should be able to explain if and when regrouping is needed, and how regrouping is computed using their chosen algorithm. During instruction, teachers and students should work together to relate place value understanding to algorithms (MTR.3.1, MTR.4.1, MTR.5.1).

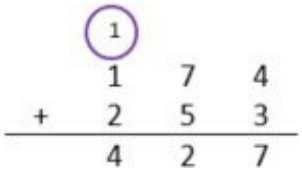
- Problems should include both vertical and horizontal forms, including opportunities for students to apply the commutative and associative properties.
- Instruction of this benchmark should be taught with MA.3.NSO.1.4. Students should use rounding as a means to estimate reasonable solutions of sums and differences before calculating (MTR.6.1).

Common Misconceptions or Errors

- Students who learn a standard algorithm without being able to explain why it works using place value understanding often make computational errors and/or cannot determine if their solutions are reasonable. To assist students with this misconception, teachers should expect students to justify the algorithm they choose.

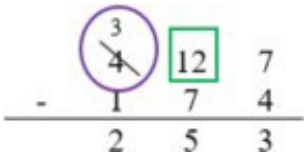
Strategies to Support Tiered Instruction

- Instruction includes guiding students through the process of estimating reasonable values for sums and differences using understanding of place value, addition and subtraction.
    - For example, students make reasonable estimates for the sum of 174 + 253. Instruction includes a prompt such as "Before using an algorithm, we will estimate the sum to make sure that we are using the algorithm correctly and our answer is reasonable. The first addend of 174 is close to the benchmark number 200 and the second addend of 253 is close to the benchmark number 250. So, we can use 200 + 250 = 450 to estimate that our sum should be close to 450."
- Instruction includes guiding students through the process of explaining and justifying the chosen algorithm and determining if an algorithm was used correctly by reviewing the reasonableness of solutions.
    - For example, students use a standard algorithm to solve 174 + 253 and explain their thinking using a place value visual representation. Instruction includes a prompt such as "Begin by adding in the ones place. 4 ones plus 3 ones is 7 ones. Because the total number of ones is less than 10 ones, it is not necessary to regroup. Next, add in the tens place. 7 *tens* plus 5 *tens* is 12 *tens*. Because I have more than 10 *tens* it is necessary to regroup the 10 *tens* to make *one hundred*. After composing a group of 10 *tens* there are 2 *tens* remaining. Finally, add 1 *hundred* plus 2 *hundreds*. Add the 1 *hundred* that was regrouped from the tens place. The sum is 427. Our sum of 427 is close to our estimate of 450, this helps us determine that our answer is reasonable"

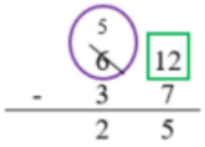


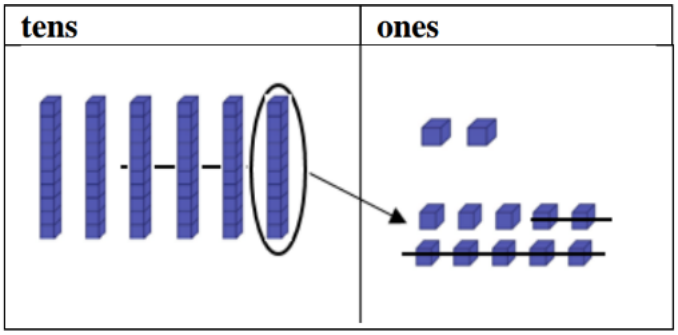
    - For example, students use a standard algorithm to solve 327 − 174 and explain their thinking using a place value visual representation. Instruction includes prompt such as "Begin subtracting 174 starting in the ones place. 7 *ones* minus

4 *ones* are 3 *ones*. There are not enough tens to subtract 7 *tens* from 2 *tens*. It is necessary to decompose one hundred into 10 *tens*. Now there are 12 *tens*, and there is enough to subtract 7 *tens*. 12 *tens* minus 7 *tens* equals 5 *tens*. Finally, subtract the hundreds: 3 *hundreds* minus 1 *hundred* equals 2 *hundreds*. The difference is 253."



- For example, students use a standard algorithm and base-ten blocks to solve 62 – 37 and explain their thinking using a place value visual representation. Instruction includes a prompt such as "Begin subtracting 37 starting in the ones place. There are not enough ones to subtract 7 *ones* from 2 *ones*. It is necessary to decompose *one ten* into 10 *ones*. Now there are 12 *ones* and there is enough to subtract 7 *ones*. 12 *ones* take away 7 *ones* equals 5 *ones*. Finally, subtract the tens: 5 *tens* minus 3 *tens* is 2 *tens*. The difference is 25."





- Teacher provides guidance on using strategies based on place value to add and subtract.
  - For example, students use strategies based on place value to solve 174 + 253.

$$\begin{array}{rrrr} & 1 & 7 & 4 \\ + & 2 & 5 & 3 \\ \hline & & & 7 \\ & 1 & 2 & 0 \\ + & 3 & 0 & 0 \\ \hline & 2 & 2 & 7 \end{array}$$

sum of ones
sum of tens
sum of hundreds

$$\begin{array}{rrrrrrrr} 174 = & 100 & + & 70 & + & 4 & \\ 253 = & 200 & + & 50 & + & 3 & \\ \hline & 300 & + & 120 & + & 7 & = 427 \end{array}$$

Questions to ask students:

Which way do we regroup when we add?

- Students should be able to explain that when they add multi-digit numbers with regrouping they regroup to the left because the place values get larger. They should explain that 10 units make 1 ten rod, 10 rods make 1 flat, and 10 flats make 1 cube. With that knowledge they will then be able to understand and explain that when they have 10 or more than 10 of one place value they need to regroup to the greater place value.

Which way do we regroup when we subtract?

- Students should be able to explain that when they subtract multi-digit numbers with regrouping they regroup from the larger to the smaller place value or to the right. Students should be able to explain that they will regroup 10 from the greater place value and add it to the current digit in said place value.

Why do we regroup when we add?

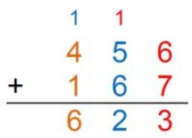
- Students should be able to explain that regrouping happens in addition when there is more than 10 in a place value.

Why do we regroup when we subtract?

- Students should be able to explain that regrouping happens in subtracting when the place value being worked in is unable to have the number taken away. They take one ten and regroup it to the place value that needs it so they can then subtract the value needed.

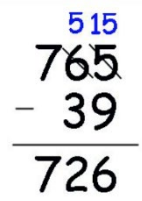
Use the most efficient strategy to find the sum of of 456 and 167.

- Sample answer to demonstrate understanding: Students may find the most efficient strategy to be using the standard algorithm. Students should be able to explain why they needed to regroup.



Use the most efficient strategy to find the difference of 765 and 39.

- Sample answer to demonstrate understanding: Students may find the most efficient strategy to be using the standard algorithm. Students should be able to explain why they needed to regroup.



Instructional Tasks

Instructional Task 1

Miranda finds 492 seashells during her vacation. She now has 1,045 seashells in her collection. How many seashells did she have in her collection before vacation?

Part A. Solve using a standard algorithm.

Part B. Indicate one step where you needed to regroup while solving and show how you did it using words or a pictorial model.

Instructional Items

Instructional Item 1

What is the sum of 1,432 and 2,981?

Instructional Item 2

What is the difference of 8,000 and 1,432?

Achievement Level Descriptors

Benchmark		Context	Assessment Limits
MA.3.NSO.2.1 Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency.		Mathematical	Sums are limited to be between 1,001 and 10,000.
ALD 2	**ALD 3**	**ALD 4**	**ALD 5**
adds and subtracts within 100 using a standard algorithm.	adds and subtracts multi-digit whole numbers within 1,000 using a standard algorithm.	adds and subtracts multi-digit whole numbers using a standard algorithm with procedural fluency	justifies the steps in adding and subtracting multi-digit whole numbers, including identifying an error.

Additional Resources:

CPALMS Resources

Fluency Game

Practice Questions and Worksheet

Resources/Tasks to Support Your Child at Home:

Subtraction Video and Practice

Addition Video and Practice

Khan Academy Adding with regrouping

Khan Academy Subtracting with regrouping