MA.5.NSO.2.2

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

Benchmark of Focus

MA.5.NSO.2.2	Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders asfractions.

Example: The quotient 27 ÷ 7 gives 3 with remainder 6 which can be expressed as $3\frac{6}{7}$

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is not to use simplest form for fractions.

Related Benchmark/Horizontal Alignment

- MA.5.FR.2.4
- MA.5.AR.1.1/1.3
- MA.5.M.1.1
- MA.5.GR.3.3

Vertical Alignment

Previous Benchmarks

- MA.4.NSO.2.4

Next Benchmarks

- MA.6.NSO.2.1

Terms from the K-12 Glossary

- Equation
- Expression
- Whole Number

Purpose and Instructional Strategies

The purpose of this benchmark is for students to demonstrate procedural fluency while dividing multi-digit whole numbers with up to 5-digit dividends and 2-digit divisors. To demonstrate procedural fluency, students may choose the standard algorithm that works best for them and demonstrates their procedural fluency. A standard algorithm is a method that is efficient and accurate (MTR.3.1). In Grade 4, students had experience dividing four-digit by one-digit numbers using a method of their choice with procedural reliability (MA.4.NSO.2.4). In Grade 6, students will multiply and divide multi-digit numbers including decimals with fluency (MA.6.NSO.2.1).

- 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 division. (MTR.6.1)

- In this benchmark, students are to represent remainders as fractions. In the benchmark example, the quotient of 27 ÷ 7 is represented as $3\frac{6}{7}$ Students should gain understanding that this quotient means that there are 3 full groups of 7 in 27, and the remainder of 6 represents $\frac{6}{7}$ of another group. Students are not expected to have mastery of converting between forms (fraction, decimal, percentage) until grade 6 but students should start to gain familiarity that fractions and decimals are numbers and can be equivalent (i.e., aremainder of ½ is the same as 0.5). Writing remainders as fractions or decimals is acceptable. Similarly, students should be able to understand that a remainder of zero means that whole groups have been filled without any of the dividend remaining. (MTR.5.1, MTR.7.1)
- Along with using a standard algorithm, students should estimate reasonable solutionsbefore solving. Estimation helps students anticipate possible answers and evaluate whether their solutions make sense after solving.
- This benchmark supports students as they solve multi-step real-world problems involving combinations of operations with whole numbers (MA.5.AR.1.1). In a real-world problem,students should interpret remainders depending on its context.

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.

Questions to ask students:

- Ask a student that is using the standard algorithm how their strategy connects to place value.
  (Example: 128 ÷ 5)
  - Sample answer that indicates understanding: I must decompose the 100 into 10 tens so that I can put 2 tens into each of the 5 groups equally. There will be 2 tens and 8 ones left. I must decompose the 2 tens into 20 ones to add to the 8 ones for a total of 28 ones. I can place 5 ones equally into each of the 5 groups. There will be 3 ones left over. As a fraction the remainder is $\frac{3}{5}$ of another group.
  - Sample answer that indicates an incomplete understanding or misconception: First I divide, then I multiply, next I subtract, and drop down the next digit. I repeat the steps as needed.

- Ask students if there is another way to solve the division problem.
    - Could solve it using repeated subtraction or using an unknown factor multiplication problem.
    - Additionally, students may use a less efficient algorithm such as partial quotients. This could indicate that they understand division, but do not yet understand the standard algorithm. Students needs support with connecting the algorithms they do know to the standard algorithm.
- Ask students to explain how they know their answer is reasonable.
    - Students should have an estimation strategy they can employ to develop an approximation of the solution.

Instructional Tasks

Instructional Task 1

The Magnolia Outreach organization is donating 6,924 pounds rice to families in need. Theypour all the rice into 15-pound containers.

Part A. How many containers will they fill if they use all the rice?

Part B. Will Magnolia Outreach be able to fill all the containers completely? If not, will the partially filled container be more or less than half-full? Explain how you know.

Instructional Items

Instructional Item 1

What is the quotient of 498 ÷ 72?

Benchmark	Context	Assessment Limits
MA.5.NSO.2.2 Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions. Example: The quotient 27 ÷ 7 is 3 with remainder 6 which can be expressed as $3\frac{6}{7}$. Clarification 1: Within this benchmark, the expectation is not to use simplest form for fractions.	Mathematical	Items containing a divisor with one digit must have a dividend with five digits. Items may include whole number quotients.

ALD 2	ALD 3	ALD 4	ALD 5
N/A	divides multi-digit whole numbers, up to five digits by one digit, with	divides multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with	identifies an error and divides multi-digit whole numbers, up to five digits by two digits, including using a standard

	remainders and represents remainders as fractions.	procedural fluency, and represents remainders as fractions.	algorithm and represents remainders as fractions with procedural fluency.

Additional Resources:

CPALMS

Khan Academy

Resources/Tasks to Support Your Child at Home:

Whole Number Division Games