NEW MEXICO
Public Education Department

5.NBT: NUMBER & OPERATIONS IN BASE 10

Cluster Statement: Perform operations with multi-digit whole numbers and with decimals to hundredths.

Major Cluster This standard represents major work for this grade. As a reminder, 65-85% of instructional time over the course of the year should be focused on the major work of the grade.

Standard Text	**Standards of Mathematical Practices**	**Student who Demonstrate Understanding Can:**
5.NBT.B.5: Fluently multiply multi-digit whole numbers using the standard algorithm.	SMP 7: Students can look for and make use of structure when using standard algorithm and explain how it works.	• Multiply multi-digit whole numbers. • Use multiple strategies including traditional algorithm. **Depth of Knowledge:** 1 **Bloom's Taxonomy:** Apply
Standard Text	**Standards for Mathematical Practices:**	**Student who Demonstrate Understanding Can:**
5.NBT.B.6: Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	SMP 1: Students can make sense of problems and persevere in solving them by using the relationship between addition and subtraction, and between multiplication and division.	• Explain calculations using equations or models that represent understanding of division. • Find whole number quotients of whole numbers with four-digit dividends and vtwo-digit divisors. • Use multiple strategies to solve division problems. **Webb's Depth of Knowledge:** 1 **Bloom's Taxonomy:** Understand, Apply
Standard Text	**Standards for Mathematical Practices:**	**Student who Demonstrate Understanding Can:**
		• Justify reasoning with written explanation.

<table>
<tr>
<td rowspan="2">5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</td>
<td rowspan="2">SMP 3: Students can construct viable arguments and critique the reasoning of others by justifying their calculations with written explanations.</td>
<td>• Explain how place value affects how to use the four operations.
• Use the four operations with decimals to the hundredths.
• Use models or drawings.</td>
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<tr>
<td>Depth of Knowledge: 1

Bloom's Taxonomy: Apply, Analyze</td>
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<td><u>Previous Learning Connections</u>
• Connect to using place value understanding and properties of operations to perform multi-digit arithmetic. (4.NBT.4,5,6)</td>
<td><u>Current Learning Connections</u>
• Connect to understanding the place value concept that the number to the left is 10 times larger and the number to the right is 10 times smaller, will use exponents to express powers of 10 and can understand the patterns of zeros and decimal placement related to powers of 10. (5.NBT.1,2)
• Connect to applying and extend their previous understandings of multiplication and division to multiply and divide fractions. (5.NF.1,3,4,6,7)
• Connect to converting customary and metric measurement units within a given measurement system. (5.MD.1)</td>
<td><u>Future Learning Connections</u>
• Connect to fluently adding, subtracting, multiplying, and dividing decimals using the standard algorithm. (6.NS.2,3)
• Connect to recognizing that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. 5.NBT.A.1
• Connect to read, write, and compare decimals to thousandths. 5.NBT.A.3</td>
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<td colspan="3">Clarification Statement:
5.NBT.B.5: In fifth grade, students fluently compute products of whole numbers using the standard algorithm. Underlying this algorithm are the properties of operations and the base-ten system. Division strategies in fifth grade involve breaking the dividend apart into like base-ten units and applying the distributive property to find the quotient place by place, starting from the highest place. (Division can also be viewed as finding an unknown factor: the dividend is the product, the divisor is the known factor, and the quotient is the unknown factor.) Students continue their fourth-grade work on division, extending it to computation of whole number quotients with dividends of up to four digits and two-digit divisors. Estimation becomes relevant when extending to two-digit divisors. Even if students round appropriately, the resulting estimate may need to be adjusted.
Computation algorithm. A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly.
Computation strategy. Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another.
This standard refers to fluency which means accuracy (correct answer), efficiency (a reasonable amount of steps), and flexibility (using strategies such as the distributive property or breaking numbers apart also using strategies according to the numbers in the problem, 26 x 4 may lend itself to (25 x 4) + 4 where as another problem might lend itself to making an equivalent problem 32 x 4 = 64 x 2)). This standard builds upon students' work with multiplying numbers in third and fourth grade. In fourth grade, students developed</td>
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understanding of multiplication through using various strategies. While the standard algorithm is mentioned, alternative strategies are also appropriate to help students develop conceptual understanding. The size of the numbers should NOT exceed a three-digit factor by a two-digit factor.
5.NBT.B.6: This standard reference various strategies for division. Division problems can include remainders. Even though this standard leads more towards computation, the connection to story contexts is critical. Make sure students are exposed to problems where the divisor is the number of groups and where the divisor is the size of the groups. In fourth grade, students' experiences with division were limited to dividing by one-digit divisors. This standard extends students' prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a "familiar" number, a student might decompose the dividend using place value.
5.NBT.B.7: In fourth grade, students' experiences with division were limited to dividing by one-digit divisors. This standard extends students' prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a "familiar" number, a student might decompose the dividend using place value.

Common Misconceptions

- Students who only memorize steps for algorithms without understanding will confuse the "steps" in the addition algorithm with the "steps" in the multiplication algorithm.
- Students might compute the sum or difference of decimals by lining up the right-hand digits as they would whole number.

Multi-Layered System of Supports (MLSS)/Suggested Instructional Strategies
Pre-Teach

Pre-teach (targeted): *Pre-teach Targeted: What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*

- For example, some learners may benefit from targeted pre-teaching that rehearses prior learning when studying operations with multi-digit whole numbers and with decimals to hundredths because in previous grade levels, students began with modeling and exploring the meaning of whole and two-digit number multiplication. At this point, students need to continue multiplying and dividing multi-digit numbers to make the connections between whole numbers and decimal numbers.

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*

- 3.OA.B.5: This standard provides a foundation for work with performing operations with multi-digit whole numbers and with decimals to hundredths because students start applying the property of operations as strategies to multiply and divide by using the commutative property of multiplication, associative property of multiplication, and distributive property.. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Core Instruction

Access

Perception: *How will the learning for students provide multiple formats to reduce barriers to learning, such as providing the same information through different modalities (e.g., through vision, hearing, or touch) and providing information in a format that will allow for adjustability by the user?*

- For example, learners engaging with performing operations with multi-digit whole numbers and decimals to hundredths benefit when learning experiences ensure information is accessible to learners with sensory and perceptual disabilities, but also easier to access and comprehend for many others such as displaying information in a flexible format to vary perceptual features such as applying previous experiences using models, strategies, place value, and problem context in multiplication and division operations because students will be able to add and subtract whole numbers fluently, convert

multiplication contexts to efficient algorithm, explore division examples to find efficient procedures for division and apply the understanding of whole numbers to using decimals in performing operations.

Build

Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*

- For example, learners engaging with performing operations with multi-digit whole numbers and decimals to hundredths benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as providing feedback that is frequent, timely, and specific because students must be able to understand the solving of multiplication and division in order to continue the scaffolding of decimals . It is important to obtain feedback in order to correctly guide students to the procedures of each operation, how to correctly solve them and apply that understanding to using decimals. For example, knowing that if they multiply whole numbers the answer will be a whole number. However, when they multiply tenths by tenths, the answer will be in the hundredths.

Language and Symbols: *How will the learning for students provide alternative representations to ensure accessibility, clarity and comprehensibility for all learners? (e.g., a graph illustrating the relationship between two variables may be informative to one learner and inaccessible or puzzling to another; picture or image may carry very different meanings for learners from differing cultural or familial backgrounds)*.

- For example, learners engaging with performing operations with multi-digit whole numbers and decimals to hundredths benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as making connections to previously learned structures because students will have the opportunity to make explicit connections from concrete and pictorial models to solving written equations, by using estimation, models, and place value structure.

Expression and Communication: *How will the learning provide multiple modalities for students to easily express knowledge, ideas, and concepts in the learning environment?*

- For example, learners engaging with performing operations with multi-digit whole numbers and decimals to hundredths benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as providing multiple examples of ways to solve a problem (i.e. examples that demonstrate the same outcomes but use differing approaches, strategies, skills, etc.) because students will be able to use different models and tools such as area models, number line, and partial products to connect conceptual understanding to procedural skills. Students will also use the structure of mathematics, including the use of place value and properties to use efficiency algorithm.

Internalize

Comprehension: *How will the learning for students support transforming accessible information into usable knowledge, knowledge that is accessible for future learning and decision-making?*

- For example, learners engaging with performing operations with multi-digit whole numbers and decimals to hundredths benefit when learning experiences attend to students by intentionally building connections to prior understandings and experiences; relating important information to the learning goals; providing a process for meaning making of new learning; and, applying learning to new contexts such as highlighting previously learned skills that can be used to solve unfamiliar problems because students need to use previous knowledge of multiplication and division in order to understand the use of decimals.

Re-teach

Re-teach (targeted): *What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisiting during a unit?*

- For example, students may benefit from re-engaging with content during a unit on performing operations with multi-digit whole numbers and with decimals to hundredths by revisiting student thinking through a short mini-lesson because it is important to ensure students are comprehending the relationship between multiplication and division with decimal numbers. In the same way, students will be encouraged to explain their thinking about a specific problem.

Re-teach (intensive): *What assessment data will help identify content needing to be revisited for intensive interventions?*

- For example, some students may benefit from intensive extra time during and after a unit performing operations with multi-digit whole numbers and with decimals to hundredths by confronting student misconceptions because students need to understand the importance of place value, regrouping, and remainders when solving operations.

Extension

What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?

- For example, some learners may benefit from an extension such as the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying performing operations with multi-digit whole numbers and with decimals to hundredths because students could continue with the division algorithm which is exposed in sixth grade.

Culturally and Linguistically Responsive Instruction:

Validate/Affirm: How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages?
Build/Bridge: How can you create connections between the cultural and linguistic behaviors of your students' home culture and language the culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?

Using and Connecting Mathematical Representations: The standard for mathematical practice, use appropriate tools strategically, provides a strong foundation to validate and bridge for students. Mathematical representations are mathematical tools. The linguistic and cultural experiences of students provide different and varied types of representations for solving mathematical problems. By explicitly encouraging students to use multiple mathematical representations students can draw on their "mathematical, social, and cultural competence". By valuing these representations and discussing them we can connect student representations to the representations of school mathematics and build a bridge for students to position them as competent and capable mathematicians. For example, when studying to perform operations with multi-digit whole numbers and with decimals to hundredths the use of mathematical representations within the classroom is critical because students' affirmation and validations of home language and culture is used by allowing them to use different representations for effective algorithm form. They can use models, strategies, place value, problem contexts, area models, number lines, and partial products to solve whole number problems and make the connection to decimal numbers.

Standards Aligned Instructionally Embedded Formative Assessment Resources:

Source: Cognia

A math contest will be held at Riverdale School. The costs for the math contest are shown in this table.

Type of Costs	Cost
Copy of the test	$ 1.00 for each student
Snack	$ 2.00 for each person
Lunch	$ 4.00 for each person
Required fee	$75.00

Each team has 5 students and 1 coach for a total of 6 people.

A. What is the total cost, in dollars, for the copies, snacks, and lunches for one team?

There are 12 teams coming to the math contest.

B. What is the total cost, in dollars, to the school for the math contest? Show your work or explain how you know.

Riverdale School's budget for the math contest is $800. Each team will bring one or more alternative students. The alternate students will each get a copy of the test, a snack, and a lunch. All teams must bring the same number of alternative students.

C. What is the greatest number of alternate students that each team can bring without going over the $800 budget? Show your work or explain how you know.

Answer Key

Constructed-Response Rubric	
Score	**Description**
4	5 points
3	4 points
2	2 or 3 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No Response.

Scoring Notes

Part a:	1 point	for correct answer, ($)**41**
Part b:	2 points	for correct answer, ($)**567**, or correct answer based on work in previous part, with correct strategy shown
	OR	
	1 point	for correct answer with insufficient or no explanation or work shown
		or
		for correct strategy with incorrect or no answer
Part c:	2 points	for correct answer, **2** (alternates), or correct answer based on work in previous parts, with correct strategy shown
	OR	
	1 point	for correct answer with insufficient or no explanation or work shown
		or
		for correct strategy with incorrect or no answer
		or
		for concluding that no alternates can be added, based on an incorrect part b that has a total that would not allow for alternates

Sample Response

a. 6 x 4 + 6 x 2 + 5 = 41 for each team.

b. $41.00 × 12 = $492 for person costs. Then add $75 for the required fee. The total is $567.

c. $800 – $567 = $233. 1 + 2 + 4 = $7. Each student costs $7. $7 × 12 = $84.

$84 for 1 alternate per team. 233 ÷ 84 = $2\frac{65}{84}$. So, only 2 alternates per team.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on operations with multi-digit whole numbers and with decimals to hundredths, consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students, for example, learning about money and how it breaks down into decimals when paying for something. Making a grocery list and adding up the total amount a person needs to pay and subtract that from a specific amount that will be paid to see what the change (difference) will be. Understanding that we use dollars in the form of whole numbers and cents in the form of decimal numbers.	STEM: Using given or collected data, round numbers to a given whole number or decimal place to solve real-world problems.