New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

The NMIS is a teacher-influenced tool, designed to provide instructional planning support at the programmatic level for districts and instructional level for teachers. Its foundation stems from the vision and mission of the PED and came into existence to assure that students in NM will be engaged in a culturally and linguistically responsive educational system that meets the social, emotional, and academic needs of ALL students. This is also rooted in the belief that all students must have access to on-grade-level standards, focusing on acceleration. The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

Standards are defined as the most critical prerequisite skills and knowledge. This document is color-coded to reflect both anchor and priority standards. Though previous emphasis was placed on priority standards to address lost learning due to COVID-19, New Mexico teachers should note that moving forward, while priority standards allow for acceleration of learning, all standards should be addressed in instruction throughout the school year.

In this guide you will find:

- A breakdown of each of the grade level standards within the cluster, including:
    - Standards of Mathematical Practice
    - Common Misconceptions
    - Identification of Priority Standards, as identified by NMPED.
    - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student Discourse Guide
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Use the four operations with whole numbers to solve problems.
  - 4.OA.A.1
  - 4.OA.A.2
  - 4.OA.A.3
- Gain familiarity with factors and multiples
  - 4.OA.B.4
- Generate and analyze patterns
  - 4.OA.C.5

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Operations and Algebraic Thinking**	**Use the four operations with whole numbers to solve problems**

Cluster Standard: 4.OA.A.1

Standard	Standards for Mathematical Practice
Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	• **SMP 3:** Construct viable arguments and critique the reasoning of others • **SMP 7:** Look for and make use of structure
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to use multiplication equations to represent verbal multiplicative comparisons. This standard also calls for students to conceptually represent multiplicative comparisons. The focus lies in understanding comparisons NOT simply identifying each factor or product without understanding the meaning. Students should relate multiplicative reasoning to iterating-that is, to making multiple copies- and partitioning sets of objects as well as to the length, area, and volume of physical space.	• Explain multiplication equations as multiplicative comparisons (28 is 7 times as many 4 and 4 times as many as 7) • Explain how multiplication can compare quantities - Interpret multiplicative comparison language within a word problem • Represent multiplicative comparisons • Identify a multiplication equation as showing two ways to describe a product • Write equations to represent multiplicative comparisons • Write word problems using multiplicative comparisons to describe a multiplication equation
DOK	**Blooms**
1-2	Apply

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Operations and Algebraic Thinking**	**Use the four operations with whole numbers to solve problems**

Cluster Standard: 4.OA.A.2

Standard	Standards for Mathematical Practice
Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	• **SMP 4:** Model with mathematics
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to use multiplication equations to represent verbal multiplicative comparisons. This standard also calls for students to conceptually represent multiplicative comparisons. The focus lies in understanding comparisons NOT simply identifying each factor or product without understanding the meaning. Students should relate multiplicative reasoning to iterating-that is, to making multiple copies- and partitioning sets of objects as well as to the length, area, and volume of physical space.	• Use drawings and equations (with symbols to represent an unknown) to solve multiplication word problems • Use drawings and equations (with symbols to represent an unknown) to solve division word problems • Contrast a multiplicative comparison from an additive comparison
DOK	**Blooms**
1-2	Apply

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Operations and Algebraic Thinking**	**Use the four operations with whole numbers to solve problems**

Cluster Standard: 4.OA.A.3

Standard	Standards for Mathematical Practice
Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	• **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to use ALL four operations to solve multi step word problems. It also requires students to interpret remainders in context of the word problem.	• Use drawings and equations (with symbols to represent an unknown) to solve multiplication word problems • Use drawings and equations (with symbols to represent an unknown) to solve division word problems • Use mental computation and estimation to check for reasonable solutions
DOK	**Blooms**
1-2	Apply

Common Misconceptions

• Students may confuse addition and	• Students may have trouble with the language in

multiplication. For example, when asked to write an equation for 7 times as many as 5, a student may write 7 + 5 instead of 7 x 5.	the word problems. For example, "3 times fewer" may be interpreted as the same as "3 less than" when solving word problems.

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Operations and Algebraic Thinking**	**Gain familiarity with factors and multiples**

Cluster Standard: 4.OA.B.4

Standard	Standards for Mathematical Practice
Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.	• **SMP 3:** Construct viable arguments and critique the reasoning of others • **SMP 7:** Look for and make use of structure
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to find all factor pairs for whole number in the range of 1-100. It also requires students to determine whether a whole number in the range of 1-100 is prime or composite.	• Identify factor pairs for a number using basic multiplication facts. • Determine whether a number is a multiple of another number using basic multiplication facts. • Identify prime or composite numbers. • Find all factors pairs for whole numbers 1-100 • Determine if a number in the range of 1-100 is a multiple of a given one-digit number • Understand that a whole number is a multiple of its factors • Determine if a number in the range 1-100 is prime or composite number
DOK	**Blooms**
1-2	Remember

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

NEW MEXICO Public Education Department

Common Misconceptions

• A common misconception is that the number 1 is prime, when in fact; it is neither prime nor composite.	• Another common misconception is that all prime numbers are odd numbers. This is not true, since the number 2 has only 2 factors, 1 and 2, and is also an even number.

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Operations and Algebraic Thinking**	**Generate and analyze patterns**

Cluster Standard: 4.OA.C.5

Standard	Standards for Mathematical Practice
Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.	• **SMP 8:** Look for and express regularity in repeated reasoning.

Clarification Statement	Students Who Demonstrate Understanding Can...
• Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features. After students have identified rules and features from patterns, they need to generate a numerical or shape pattern from a given rule.	• Describe rules in number and shape patterns. • Identify features of a pattern when given a rule. • Make observations about a resulting sequence given a rule, such as noticing that the terms alternate between even and odd numbers. • Model and solve multi-step word problems using equations.

DOK	Blooms

2-3	Evaluate, Create

Common Misconceptions

• Students may not think a number is a multiple of itself.	• Students may think that numbers with a greater value have more factors than numbers with a lesser value.

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of classroom discourse allows students to activate funds of knowledge and to refine their mathematical understanding. When students have frequent opportunities for discourse they find various paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Operations and Algebraic Thinking**	Strand: **Use the four operations with whole numbers to solve problems**

Suggested Student Discourse Questions

• What key words in the word problem help you decide which operation(s) to use? • Compare and contrast the two different strategies?	• If a statement says 5 times more what does that mean? • Explain the process of building your model to a partner? • Do you agree with your partner's model? Why or why not?

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

NEW MEXICO Public Education Department

ASSESSMENT GUIDE

- Use the four operations with whole numbers to solve problems
- Gain familiarity with factors and multiples
- Generate and analyze patterns

Grade	*CCSS Domain*	*CCSS Strand*
4	**Operations and Algebraic Thinking**	**Use the four operations with whole numbers to solve problems**
	Sample Task #1 (Constructed Response)	
	Amy is baking muffins. Each baking tray can hold 6 muffins. a. If Amy bakes 4 trays of muffins, how many muffins will she have in all? b. The corner bakery produced 10 times as many muffins as Amy baked. How many muffins did the bakery produce? Explain your thinking.	
	Sample Task #2 (Multiple Choice)	
	Heather is going to a fair. The cost to enter the fair is $7, and each ride costs $3. Heather has $40 to spend to enter the fair and go on rides. What is the greatest number of rides Heather can go on? A. 4 B. 5 C. 11 D. 13	

Grade	*CCSS Domain*	*CCSS Strand*
4	**Operations and Algebraic Thinking**	**Gain familiarity with factors and multiples**
	Sample Task #1 (Constructed Response)	
	Sarah made a list of all of the whole numbers from 40 to 50. a. What is the greatest prime number on Sarah's list? Explain your thinking.	

	Sample Task #2 (Multiple Choice)
	Which of these expressions are factor pairs of 56? Select the four correct answers. A. 1 x 56 B. 2 x 28 C. 3 x 18 D. 4 x 14 E. 6 x 8 F. 7 x 8

Grade	*CCSS Domain*	*CCSS Strand*
4	**Operations and Algebraic Thinking**	**Generate and analyze patterns**
	Sample Task #1 (Constructed Response)	
	Marco wrote a number pattern that followed the rule "Multiply by 3, subtract 5." The first number in his pattern is 4. What is the fourth number in Marco's pattern? Explain your thinking.	
	Sample Task #2 (Multiple Choice)	
	A number pattern starts with 7. Which rule for this number pattern would result in switching between odd and even numbers? A. Add 2. B. Add 3. C. Multiply by 2. D. Multiply by 3.	

MLSS AND CLR GUIDE

- Use the four operations with whole numbers to solve problems
- Gain familiarity with factors and multiples
- Generate and analyze patterns

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

CCSS Domain	*CCSS Cluster*
Operations and Algebraic Thinking	**Use the four operations with whole numbers to solve problems**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on using the four operations with whole numbers to solve problems, 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 teachers can encourage students to write a word problem about something at home. This could be written in conjunction with family members. This gets the family talking about the math and different examples brought back into the classroom.	
Cross-Curricular Connections	Science: In fourth grade the NGSS recommends that students will study energy. Teachers should give students opportunities to use the four operations with whole numbers to solve problems. Students will also study Earth and human activity. Teachers should give students opportunities to be quantitative in descriptions. Consider providing a connection for students to be quantitative when discussing environmental effects.	
Validate/Affirm/Build/Bridge	• *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?* • *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*	• Equity Based Practice (Posing Purposeful Questions): CLRI requires intentional planning around the questions posed in a mathematics classroom. It is critical to consider "who is being positioned as competent, and whose ideas are featured and privileged" within the classroom through both the types of questioning and who is being questioned. Mathematics classrooms traditionally ask short answer questions and reward students that can respond quickly and correctly. When questioning seeks to understand students' thinking by taking their ideas seriously and asking the community to build upon one another's ideas a greater sense of belonging in mathematics is created for students from marginalized cultures and languages. For example, when studying four operations with whole numbers to solve problems, the pattern of questions within the classroom is critical because it is important to include every student in no particular order. When grouped appropriately, students can share prior knowledge and support each other's strengths and weaknesses. Students set group norms in respect of their cultures. This enables the development of a

	mathematicians that can use mathematics within school and society?	culture of productive discourse/discussion. Encourages questioning and validation among students' groups, the use of sentence frames and positive reinforcement. The teacher can facilitate conversations through strategic questioning.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to interpreting products of whole numbers as the total number of objects in a set of groups **(3.OA.A1)** • Connect to using addition to find the total number of objects arranged in a rectangular array **(2.OA.C4)**	• Connect to process of generating a number or shape pattern that follows a given rule **(4.OA.C5)**	• Connect multiplying and dividing whole numbers to future work of multiplying and dividing fractions **(5.NF.B3)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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 using the four operations with whole numbers to solve problems because students need to represent verbal statements of multiplicative comparisons as multiplication equations.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.OA.D.8 This standard provides a foundation for working with the four operations with whole numbers to solve problems because this standard works on two step problems using the four operations. It also asks students to create an equation using a letter for unknown. 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.
Universal Support Framework		
A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• A multiplicative comparison is a situation in which one quantity is described as a multiple of another.
• How to interpret a comparison word problem as multiplication or division.
• Which operations are needed when solving multi-step word problems.
• The meaning of the remainder in a story problem.
	• Use symbols for unknown numbers to determine comparisons in multiplication and division.
	• Use numbers and symbols to represent word problems, including a letter for the unknown.
	• Solve multi-step word problems using contextual situations and reason and reflect on solutions.
	• Determine what to do with the remainder in division situations with remainders.
		• Build on students' experience with the following skills:
		  ○ Solving multi-step word problems by identifying key words to help them decide which operation to use
		  ○ Multiplying and dividing single-digit numbers within 100
		  ○ Adding and subtracting with regrouping
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Counting tiles
		  ○ Problem-solving strategies

Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to	For example, students may benefit from re-engaging with content during a unit on using the four operations with whole numbers to solve problems by examining tasks from a different perspective through a short mini-lesson

	be revisited during a unit?	because students need support in discovering different ways to solve problems. This can be through group work or small groups.
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 using the four operations with whole numbers to solve problems by confronting student misconceptions because students will need clear understanding to solve multi-step problems using the four operations. Students need practice and support when they don't understand word problems. Students need direct instruction using manipulatives.

Extension	
Essential Question	***Examples***
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 the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying using the four operations with whole numbers to solve problems because word problems are seen through the students' academic careers and will be found in a variety of places. Working on different real world problems or creating problems help students understand different situations and help with understanding of complex problems.

CCSS Domain	*CCSS Cluster*
Operations and Algebraic Thinking	**Gain familiarity with factors and multiples**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on gaining familiarity with factors and multiples, 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, students can discover different patterns that lend to factors and multiples in their home. They can further mathematical discourse with family about

	patterns and different ways factors and multiples are used in everyday life.	
Cross-Curricular Connections	Social Studies: Connect students to the history behind the Sieve of Eratosthenes, the ancient algorithm that helps us to determine factors, multiples, primes, and composites for all numbers. Study the life and accomplishments of the Greek astronomer Eratosthenes of Cyrene and teach students how to use the Sieve.	
Validate/Affirm/Build/Bridge	• *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?* • *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?*	• Facilitating Meaningful Mathematical Discourse: Mathematics discourse requires intentional planning to ensure all students feel comfortable to share, consider, build upon and critique the mathematical ideas under consideration. When student ideas serve as the basis for discussion, we position them as knowers and doers of mathematics by using equitable talk moves students and attending to the way students talk about who is and isn't capable of mathematics, we can disrupt the negative images and stereotypes around mathematics of marginalized cultures and languages. "A discourse-based mathematics classroom provides stronger access for every student — those who have an immediate answer or approach to share, those who have begun to formulate a mathematical approach to a task but have not fully developed their thoughts, and those who may not have an approach but can provide feedback to others." For example, when studying, gaining familiarity with factors and multiples facilitating meaningful mathematical discourse is critical because factors and multiples can be interpreted in many different ways. These are types of patterns that are seen in different areas of academic and life. Supporting mathematical discourse around tasks or problems with factors and multiples allows the teacher to determine misconceptions and helps the classroom develop different strategies for determining answers. A teacher can use questioning to guide and further students thinking through discourse. In the same way, the teacher can ask guiding questions about misconceptions and lead students to understanding.

Planning for Multi-Layered System of Supports

New Mexico Instructional Scope

4th Grade Operations and Algebraic Thinking Guide

Vertical Alignment		
Previous Learning	***Current Learning***	***Future Learning***
• Connect to determining the unknown value in a multiplication or division equation **(3.OA.A.4)** • Connect to fluently multiplying and dividing numbers within 100 **(3.OA.C7)** • Connect to learning about representing unknown quantities with a letter **(3.OA. D8)**	• Connect factor pairs to multiplicative comparisons **(4.OA. A1)**	• Connect to representing expressions with whole number exponents **(6.EE.A1)** • Connect to determining the greatest common factor and least common multiple of two whole numbers **(6.NS.B4)**

Suggested Instructional Strategies		
Pre-Teach		
Level of Intensity	***Essential Question***	***Examples***
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 uses images/resources (especially those being used the first time) when studying gaining familiarity with factors and multiples because it helps students with conceptual understanding and being able to visually see patterns within factors and multiples. This can be connected to different standards in previous grades such as skip counting.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.OA.C.7 This standard provides a foundation for work with gaining familiarity with factors and multiples because students will need to fluently multiply and divide within 100 and know from memory all products of two one-digit numbers. 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.
Re-Teach		
Level of Intensity	***Essential Question***	***Examples***

Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on gaining familiarity finding factor pairs of whole numbers by revisiting student thinking through a short mini-lesson because students that are struggling need support where they are having difficulty. Can they multiply or divide within 100? Do they need support for determining factors? Are they confused with the vocabulary? These are student thoughts that the teacher can work on in small groups.
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 gaining familiarity finding factor pairs of whole numbers by addressing conceptual understanding because students who have trouble with coming up with factors quickly will need additional support with conceptual understanding. This includes manipulatives or visual models. It also might include the use of mathematical tools such as a hundreds chart.

Extension	
Essential Question	***Examples***
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 explore links between various topics when studying gaining familiarity, finding factor pairs of whole numbers because students can look for factor relations through different curriculum data or real-world examples. This will help with work into 5th (fractions) and 6th (ratios)

CCSS Domain	*CCSS Cluster*
Operations and Algebraic Thinking	**Generate and analyze patterns**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on generating and analyzing patterns, 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 can be expanded to home. Students can ask questions or gather data that pertains to their home unit or culture.	
Cross-Curricular Connections	Art: Patterns are prevalent in artistic compositions. Have students generate a rule to create a mosaic pattern. For example: Given the rule "add three" and the starting point "one" create a mosaic or other artistic composition using two different colors that follows the pattern. Increase the complexity of the pattern to result in a more complex color scheme. This could also be used with notes in music.	
Validate/Affirm/Build/Bridge	• *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?* • *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 generating and analyzing patterns the use of mathematical representations within the classroom is critical because students need to understand patterns, create tables that accurately represent the mathematics, and answer questions based on the data. These representations are seen in many different areas of academics, but in everyday life and can be related to home cultures.

Planning for Multi-Layered System of Supports

Vertical Alignment		
Previous Learning	***Current Learning***	***Future Learning***

• Connect to arithmetic patterns and properties of operations **(3.OA.D.9)**	• Connect to solving problems using a letter to stand in for an unknown quantity **(4.OA.A2)** • Connect patterns to multiples and the multiplication table.	• Connect to future learning of generating two numerical patterns given two rules **(5.OA.B 3)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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, generating and analyzing patterns because students will be building on arithmetic that was built in previous grades. This standard in 4th grade will build on working with patterns, which began in previous grades.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.OA.D.9: This standard provides a foundation for work with generating and analyzing patterns because students are reasoning about operations and begin identifying patterns in addition and multiplication. 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.

Re-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on generating and analyzing patterns by revisiting student thinking through a short mini-lesson because students can usually identify patterns, but may not know how to put them into a rule or statement. Reviewing student thinking will help students identify patterns and put them into mathematical representation or tables.

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 generating and analyzing patterns by addressing conceptual understanding because students will be able to see patterns better with conceptual understanding (examples: manipulatives or concrete models). Looking at a list of numbers is an abstract skill that struggling students need to work towards. The teacher will need to support conceptual work and move students to more abstract work (example: manipulatives to data table).

Extension	
Essential Question	***Examples***
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 open ended tasks linking multiple disciplines when studying generating and analyzing patterns because data is accessible in many different subjects. Students can explore data in social studies, science, or independent investigations. In this way, students learn more about practical or real-world applications.

New Mexico Instructional Scope

4th Grade Fractions Guide

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

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New Mexico Instructional Scope

4th Grade Fractions Guide

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	Conceptual Understanding	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	Application	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	Procedural Skill and Fluency	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Extend understanding of fraction equivalence and ordering
  - 4.NF.A.1
  - 4.NF.A.2
- Build fractions from unit fractions
  - 4.NF.B.3
  - 4.NF.B.4
- Understand decimal notation for fractions, and compare decimal fractions
  - 4.NF.C.5
  - 4.NF.C.6
  - 4.NF.C.7

New Mexico Instructional Scope

4th Grade Fractions Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Extend understanding of fraction equivalence and ordering**

Cluster Standard: 4.NF.A.1

Standard	Standards for Mathematical Practice
Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n\ x\ b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	• **SMP 4:** Model with mathematics. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Equivalent fractions are fractions that represent equal value. They are numerals that name the same fractional number. Equivalent fractions have wholes that are the same size, students need to understand this concept. Upon generating a rule for finding equivalent fractions, students should understand how that connects to the identity property of multiplication or division (5/5 = 1, therefore any fraction multiplied by 5/5 would be the equivalent or equal). Students should generate and justify why their fractions are equivalent. This lends to the generation of the rule (or procedure) for equivalent fractions. Upon discovering the rule, students should be able to explain why the rule works.	• Use models to show the value of a fraction. • Explain how a fraction model represents the quantity of a fraction. • Use models to demonstrate that two fractions are equivalent. • Represent equivalent fractions using models. • Multiply and divide to find equivalent fractions.
DOK	**Blooms**
1-2	Understand

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Extend understanding of fraction equivalence and ordering**

Cluster Standard: 4.NF.A.2

Standard	Standards for Mathematical Practice
Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2 . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Equivalent fractions are fractions that represent equal value. They are numerals that name the same fractional number. Equivalent fractions have wholes that are the same size, students need to understand this concept. Upon generating a rule for finding equivalent fractions, students should understand how that connects to the identity property of multiplication or division (5/5 = 1, therefore any fraction multiplied by 5/5 would be the equivalent or equal). Students should generate and justify why their fractions are equivalent. This lends to the generation of the rule (or procedure) for equivalent fractions. Upon discovering the rule, students should be able to explain why the rule works.	• Explain how to convert two fractions to have common denominators. • Explain how to convert two fractions to have common numerators. • Convert fractions to have common denominators. • Convert fractions to have common numerators. • Compare two fractions with different numerators and denominators. • Use symbols (<, >, =) to compare two fractions
DOK	**Blooms**
1-2	Apply

Common Misconceptions	
• Students may be confused by "reducing" since it implies that the number is getting smaller.	

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Build fractions from unit fractions**

Cluster Standard: 4.NF.B.3

Standard	Standards for Mathematical Practice
4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions $1/b$. • 4.NF.B.3.A: Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. • 4.NF.B.3.B: Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8 . • 4.NF.B.3.C: Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. • 4.NF.B.3.D: Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 4:** Model with mathematics.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard builds on prior work with unit fractions where students will now investigate	• Explain why a fraction is the sum of multiple fractions.

fractions other than unit fractions such as 2/3, they should then be able to join (compose) AND separate (decompose) the fraction of the same whole. In order to gain conceptual understanding of this standard, students must be able to visualize the composition and decomposition into unit fractions. This skill will aid in the development needed to then move into adding and subtracting fractions. For students to visualize they must have multiple opportunities to model this concept by using hands on manipulatives and other appropriate tools such as creating an original drawing to develop the skill. The models should not be limited to area models only (vary the type of area model), and should include length models such as number lines, folded paper, rulers, fraction strips, and set models as well.	• Explain why addition and subtraction of fractions with the same denominator is joining or separating parts referring to the same whole. • Explain why a fraction can be a sum of different like denominator fractions. • Explain why mixed numbers can be added or subtracted. • Add and subtract fractions and mixed numbers with like denominators. • Write an equation when decomposing fractions. • Solve addition word problems involving fractions with like denominators using models and equations. • Solve subtraction word problems involving fractions with like denominators using models and equations.
DOK	**Blooms**
1-2	Apply

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Build fractions from unit fractions**

Cluster Standard: 4.NF.B.4

Standard	**Standards for Mathematical Practice**
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. • 4.NF.B.4.A: Understand a fraction a/b as a multiple of $1/b$. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5 4 = 5 × (1/4). • 4.NF.B.4.B: Understand a multiple of a b as a multiple of	• **SMP 6:** Attend to precision. • **SMP 7:** Look for and make use of structure.

$1/b$, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6 5 . (In general, n × (a/b) = (n × a/b .) • 4.NF.B.4.C: Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?	
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students will be able to model multiplication of whole numbers by unit fraction. Building on ideas of decomposing fraction into unit fractions, students will apply knowledge and work with multiplying whole numbers to this work. Using similar language, such as “groups of” or “jumps” on a number line. Students will be able to explain this using models, words and numbers. Students will also be able to look at a given picture and describe multiplication that is present, in essence working backwards. b. Students will be able to apply patterns from multiplying whole numbers by a unit fraction to multiplying whole numbers by any fractions. Students are still using models and manipulatives for this work. Students will be able to explain this using models, words and numbers. This work includes fractions that are greater than 1 or mixed numbers. Students can apply previous work with whole number multiplication to multiplication with fractions, such as area model, distributive property, etc. c. Students will be able to solve multiplication word problems that include the whole number by a fraction or mixed number. Students are still using models and manipulatives for this work. Students will be able to explain this using models, words and numbers.	• Extend the understanding of multiplication to problems that have fractions. • Multiply a unit fraction (numerator of 1) by a whole number. • Multiply a fraction with a numerator greater than 1 by a whole number. • Use a number line to represent fraction multiplication. • Explain why a fraction is a multiple of a unit fraction. • Explain why multiplying a whole number times a fraction can be changed to a whole number times a unit fraction. • Solve multiplication word problems involving whole numbers and fractions using models and equations. • Restate word problems involving multiplication of a whole number and a fraction. • Draw a diagram and write an equation to represent and solve a word problem involving multiplication of a whole number and a fraction.
DOK	**Blooms**
1-2	Apply

Common Misconceptions	
• Students may misunderstand and believe that when you multiply a fraction by a whole number, first you multiply the numerator by the whole number and then you multiply the denominator by the whole number. Students that are taught to put a 1 under the whole number and multiply straight across may lack an understanding of why this algorithm works.	

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Understand decimal notation for fractions, and compare decimal fractions**

Cluster Standard: 4.NF.C.5

Standard	Standards for Mathematical Practice
Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100 , and add 3/10 + 4/100 = 34/100	• **SMP 1**: Make sense of problems and persevere in solving them. • **SMP 8**: Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard explores the relationship between fractions and decimals. Students use previous learning of equivalent fractions to apply to denominators of 10 and 100. This includes finding equivalence, adding and subtracting tenths and hundredths using models and explanations.	• Explain how a fraction with a denominator of 10 is equal to a fraction with a denominator of 100. • Convert a fraction with a denominator of 10 to an equivalent fraction with a denominator of 100. • Add two fractions with denominators of 10 or 100.
DOK	**Blooms**

1-2	Apply

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Understand decimal notation for fractions, and compare decimal fractions**

Cluster Standard: 4.NF.C.6

Standard	Standards for Mathematical Practice
Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100 ; describe a length as 0.62 meters; locate 0.62 on a number line diagram.	• **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Decimals are introduced for the first time. Students should have ample opportunities to explore and reason about the idea that a number can be represented as both a fraction and a decimal. Decimals and fractions both represent parts of a whole	• Write fractions with denominators of 10 or 100 as decimals. • Write decimals as fractions with denominators of 10 or 100. • Write a money amount given in words as a whole dollar and fraction amount. • Write a measurement using decimals. • Write two fractions and two decimals that represent the same amount. • Develop strategies to write decimals as equivalent fractions.
DOK	**Blooms**
1-2	Understand, Apply

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Fractions**	**Understand decimal notation for fractions, and compare decimal fractions**

Cluster Standard: 4.NF.C.7

Standard	Standards for Mathematical Practice
Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	• **SMP 3**: Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to compare decimals to the hundredths when those two decimals refer to the same whole. Students compare using the symbols <, >, = and justify their response by creating a visual model. When comparing decimals, students should use models (such as hundredths grids) and number lines. When locating decimals on a number line the smaller numbers are farther to the left and the greater number is farther to the right. Students need to understand that some decimals are equivalent. Sharing examples with models to show that .4 = .40 will help students see the equivalency. Decimal numbers are rational numbers and so we can use them to indicate quantities that are less than one or between any two whole numbers. In between any two decimal numbers, there is always another decimal number.	• Reason about the size of two decimals to the hundredths place. • Use symbols (>, <, or =) when comparing decimals.
DOK	**Blooms**
1-2	Understand, Apply

Common Misconceptions

• Some students might think the longer the	

decimal, the greater the value, so 2.146 would be greater than 2.4. The shorter the decimal, the greater the value, so 6.31 would be greater than 6.482.	

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of classroom discourse allows students to activate funds of knowledge and to refine their mathematical understanding. When students have frequent opportunities for discourse they find various paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Fractions**	Strand: **Extend understanding of fraction equivalence and ordering**
Suggested Student Discourse Questions	
• Explain why these fractions are equivalent. • How can you use a model to show that these fractions are equivalent?	• Why is it important to have a common denominator when comparing fractions? • Explain the error in the problem and show how you would solve it.

Domain: **Fractions**	Strand: **Understand decimal notation for fractions, and compare decimal fractions**
Suggested Student Discourse Questions	
• Explain how a fraction with a denominator of 10 can be equal to a fraction with a	• How can your knowledge of money help you understand fractions with denominators of

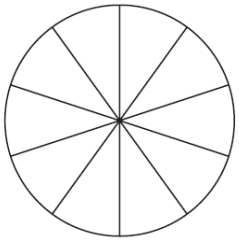
denominator of 100. (with models and manipulatives) • What happens to the numerator when the denominator changes from a 10 to a 100?	10 and 100?

ASSESSMENT GUIDE

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions.
- Understand decimal notation for fractions, and compare decimal fractions

Grade	*CCSS Domain*	*CCSS Strand*
4	**Fractions**	**Extend understanding of fraction equivalence and ordering**
	Sample Task #1 (Constructed Response)	
	On Monday, Lisa made a batch of cookies. She put frosting on ⅔ of this batch of cookies. What is a different fraction that is equivalent to ⅔?	
	Sample Task #2 (Multiple Choice)	

. A circle divided into equal parts is shown.



Which fraction is equivalent to $\frac{6}{10}$?

Ⓐ $\frac{3}{4}$

Ⓑ $\frac{3}{5}$

Ⓒ $\frac{5}{6}$

Ⓓ $\frac{5}{8}$

Grade	*CCSS Domain*	*CCSS Strand*
4	**Fractions**	**Build fractions from unit fractions**

Sample Task #1 (Constructed Response)

Use a number bond to show the relationship between 2/6 , 3/6 , and 5/6 . Then, use the fractions to write two addition and two subtraction sentences.

Sample Task #2 (Multiple Choice)

A recipe for meatballs uses ⅔ cup of breadcrumbs for 1 batch of meatballs. Anna is using this recipe to make 4 batches of meatballs. What is the total amount of bread crumbs, in cups, Anna will need to make 4 batches of meatballs?

A. 2/7 cup
B. 8/12 cup
C. 8/3 cups
D. 12/2 cups

Grade	*CCSS Domain*	*CCSS Strand*

4	Fractions	Understand decimal notation for fractions, and compare decimal fractions

Sample Task #1 (Constructed Response)

Bella is finding the value of this expression. 5/10 + 6/100. What is the sum of the two fractions? Explain your thinking.

Sample Task #2 (Multiple Choice)

In Patrick's class, 4/10 of the students have brown hair. Which number is equal to 4/10?

A. 0.04
B. 0.4
C. 0.410
D. 4.10

MLSS AND CLR GUIDE

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions.
- Understand decimal notation for fractions, and compare decimal fractions

CCSS Domain	*CCSS Cluster*
Fractions	Extend understanding of fraction equivalence and ordering

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on extending understanding of fraction equivalence and ordering fractions, 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, students can look for ways they use fractions at home and share their findings with the classroom community.	
Cross-Curricular Connections	Science: Students may track precipitation levels in fractional amounts using a graduated cylinder or rain gage.	
Validate/Affirm/Build /Bridge	• *How can you design your mathematics classroom*	• Equity Based Practice (Using and Connecting Mathematical Representations): The standard for

	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? • *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?*	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 extending understanding of fraction equivalence and ordering fractions the use of mathematical representations within the classroom is critical because students need to work with fractions presentations in many ways, many times in order to develop a strong sense of benchmark fraction knowledge in order to help when rationalizing about fraction equivalents and ordering fractions.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect to partitioning shapes into halves, thirds, and fourths in 2nd grade. • Connect to finding equivalent fractions and using symbols to compare fractions in 3rd grade.	• Connect to learning about multiplicative comparison. **(4.OA. A2)** • Connect to learning about using an understanding of relative size to convert between units of measurement. **(4.MD. A1)**	• Connect to adding and subtracting fractions and mixed numbers with unlike denominators. **(5.NF. A1)** • Connect to solving fraction addition and subtraction word problems. **(5.NF. A2)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	*Essential Question*	*Examples*

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 to extend understanding of fraction equivalence and ordering because students have worked with simple equivalent fractions and comparing fractions with denominators of 2, 3, 4, 6, and 8.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.NF.A.3: This standard provides a foundation for work with extended understanding of fraction equivalence and ordering because in this third grade standard students begin to work with simple equivalent fractions and comparing using similar numerator and denominator. This is foundational work with equivalent and ordering fractions. 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.

Universal Support Framework		
A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• Connections between visual and numerical representations of equivalent fractions.
• How number and size of the fraction parts can differ but are still equal
• How to convert two fractions to have common denominators.
• How to convert two fractions to have common numerators.
	• Recognize equivalent fractions.
	• Convert fractions to have common denominators.
	• Convert fractions to have common numerators.
	• Compare two fractions with different numerators and denominators.
		• Build on students' experience with the following skills:
		  ○ Compare fractions
		  ○ Ability to explain what a numerator and a denominator represent
		  ○ Represent fractions visually and on a number line
		  ○ Identify and represent unit fractions
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:

		○ Fraction tiles/circles ○ Equivalent fractions reference sheets
Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on extending understanding of fraction equivalence and ordering by revisiting student thinking through a short mini-lesson because teachers can assess what students already know and build on their thinking. Teachers can also see misconceptions in student thinking and correct them during a mini-lesson.
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 extending understanding of fraction equivalence and ordering by addressing conceptual understanding because students need understanding in fractions. Students who struggle with fractions tend to look at numbers within fractions and try to generalize them. Students with these types of misconceptions will need concrete work with manipulatives to build conceptual understanding. They will need to physically see that ½ bar is bigger than ¼ bar, even though in whole numbers a 4 is greater than 2.

Extension	
Essential Question	***Examples***
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 extend understanding of fraction equivalence and ordering because students need extensive work in equivalent fractions to become fluent with simple fractions (2/4 is equal to ½, etc.). This work will help them become flexible with equivalent fractions (reducing) and build foundational understanding for 5th grade work.

New Mexico Instructional Scope

4th Grade Fractions Guide

CCSS Domain	*CCSS Cluster*
Fractions	**Build fractions from unit fractions**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on building fractions from unit fractions by applying and extending previous understandings of operations with whole numbers, 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, examining fractions of students in the classroom and fractions of members in a family to help students work within decomposing one whole. The one whole is the classroom, family, team, or other group a student is connected to outside of school. This will help students understand that a whole can vary in size.	
Cross-Curricular Connections	STEM Connection: Students can create a measuring cup for a science experiment. As they do, have students pay attention to precision and remind them the parts must be equal. The act of partitioning reinforces an understanding of the relationship between the unit fraction and the whole. Reinforce the relationship between mixed numbers and their fraction equivalent. Music: Students can partition a unit fraction (or beat) into smaller unit fractions (e.g., subdividing each fourth note to create 2 eighth notes). This helps students see mathematical and musical relationships among: ● the denominator (the type of note) ● the number of parts in the whole quantity (how many fit into a bar) ● the size of the part (the duration of that note) https://thelearningexchange.ca/wp-content/uploads/2018/04/cbs-fraction-across-curiculum-en.pdf	
Validate/Affirm/Build/ Bridge	● *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*	● Equity Based Practice (Building Procedural Fluency from Conceptual Understanding): Instruction should build from conceptual understanding to allow students opportunities to make meaning of mathematics before focusing on procedures. When new learning begins with procedures it privileges those with strong prior familiarity with school mathematics procedures for solving problems and does not allow learning to build for more methods for solving tasks that occur outside of school mathematics. For example, when studying building

	and languages? • *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?*	fractions from unit fractions by applying and extending previous understandings of operations with whole numbers the types of mathematical tasks are critical because we are connecting to previous work with decomposing whole numbers and to work with "groups of" used in multiplication.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to understanding a 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a part of size 1/b. **(3.NF.A1)** • Connect fraction and decimal notation to measuring the length of an object to ½ and 1/4 inches. **(3.MD.B4)** • Connect to multiplication and division within 100 involving arrays, equal groups, and measurement quantities. **(3.OA.A.3)**	• Connect converting fractions and decomposing fractions to converting measurements from a larger unit to a smaller unit. **(4.MD A2)**	• Connect to extending and applying multiplication to multiply a fraction or whole number by a fraction. **(5.NF.B4)** • Connect to interpreting multiplication as scaling/ resizing. **(5.NF.B5)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***

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 analyzes common misconceptions when studying building fractions from unit fractions by applying and extending previous understandings of operations on whole numbers because it allows the teacher to plan in order to meet individual student needs, small group needs, and whole class needs.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.NF.A: These standards provide a foundation for work with building fractions from unit fractions by applying and extending previous understandings of operations on whole numbers because it helps students understand what the parts of a fraction represent and see fractions as numbers. 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.

Universal Support Framework		
A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• A fraction is the sum of multiple fractions.
• Addition and subtraction of fractions with the same denominator is joining or separating parts referring to the same whole.
• All fractions are multiples of a unit fraction.
• Multiplying a whole number times a fraction can be changed to a whole number times a unit fraction.
	• Add fractions with like denominators.
	• Add mixed numbers with like denominators.
	• Write an equation when decomposing fractions.
	• Multiply a fraction with a whole number.
		• Build on students' experience with the following skills:
		  ○ Partitioning, identifying, and labeling unit fractions
		  ○ Understanding the difference between numerator and denominator
		  ○ Using visual fraction models and equations
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Fraction tiles/circles

		○ Equivalent fractions reference sheets
Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on building fractions from unit fractions by applying and extending previous understandings of operations on whole numbers by providing specific feedback to students on their work through a short mini-lesson because specific feedback during a one-on-one or small group mini-lesson helps students see the mistake. Working through a few more problems where the student can immediately apply the feedback strengthens their understanding of building from unit fractions and/or decomposing a fraction into unit fractions.
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 building fractions from unit fractions by applying and extending previous understandings of operations on whole numbers by addressing conceptual understanding because students need to work with concrete manipulatives when struggling with fractions. This can include area models, fraction strips, number lines, and other visual models. This will build conceptual understanding and mental pictures for student work with fractions.

Extension	
Essential Question	***Examples***
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 building fractions from unit fractions by applying and extending previous understandings of operations on whole numbers because students need extended work with fractions. They need to reason about fractions and part of a whole. Students can use extended work to make generalizations and

	reasonings about work with fractions. For example, the denominator stays the same because the fractional pieces are equivalent. This also includes connections between addition, multiplying, and properties of operations that apply here as well.

CCSS Domain	*CCSS Cluster*
Fractions	**Understand decimal notation for fractions, and compare decimal fractions**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on understanding decimal notations for fractions and compare decimal fractions, 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, students learn about the ways decimals are used in the real world, both at home and in the community. Students connect to the Imperial and Metric systems of measurement to make global connections. Students could examine ways decimals are used in various occupations which could connect to families and/or the world in general.	
Cross-Curricular Connections	STEM Connection: Students can create a measuring cup for a science experiment using the metric system. As they do, have students pay attention to precision and remind them the parts must be equal. The act of partitioning reinforces an understanding of the relationship between the decimal fraction and the whole.	
Validate/Affirm/Build/ Bridge	• *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?* • *How can you create connections between the cultural and linguistic behaviors of your students' home culture*	• Equity Based Practice (Eliciting and Using Evidence of Student Thinking): Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time." For example, when studying understanding decimal notations for fractions and compare decimal fractions eliciting and using student thinking is critical because when working with expressing fractions with a denominator of 10 as a fraction with a denominator of 100 in order to add two fractions (or the opposite) turning decimals into fractions (or the opposite), and comparing decimals all require a solid

	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?	understanding of part to whole relationships, renaming using equivalents based on place value, and overall place value understanding. When students habitually explain their thinking, they find successes and mistakes. These mistakes become learning opportunities as opposed to failures.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to exploring fractions on a number line in third grade. • Connect to explaining equivalence and generating equivalent fractions. **(3.NF.3)** • Connect to understanding that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. **(2.NBT.1)** • Connect to comparing two fractions with the same numerator or the same denominator by reasoning about their size. **(3.NF.3)**	• Connect to adding and subtracting fractions with like denominators. **(4.NF.3)** • Connect to solving measurement word problems involving decimals. **(4.MD.2)** • Connect to reading, writing, and comparing multi-digit whole numbers. **(4.NBT.2)** • Connect to comparing fractions with different numerators and denominators. **(4.NF.2)**	• 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.1)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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, understanding decimal notation for fractions, and comparing decimal fractions because teachers will need to review equivalent fractions and comparing fractions from 3rd and 4th grade standards. Students can also use

		base ten blocks to represent decimals. Previous work with base ten blocks will depend on student experience.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.NF.A.3: This standard provides a foundation for work with understanding decimal notation for fractions and comparing decimal fractions because this third grade standard is the first traditional work with equivalent fractions for students. 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.
Universal Support Framework		
A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• How a fraction with a denominator of 10 is equal to a fraction with a denominator of 100.
• Fractions with denominators of 10 or 100 can be written as decimals.
• The relationship among decimal places.
	• Change a fraction with a denominator of 10 to an equivalent fraction with a denominator of 100.
	• Add two fractions with denominators of 10 or 100.
	• Model, read, and write a fraction with denominators of 10 or 100 as decimals.
	• Compare decimals with denominators of 10 or 100 using a strategy that makes sense, including fraction numbers, base-ten blocks, or the number line.
		• Build on students' experience with the following skills:
		  ○ Knowledge of money (1/100, 1/10)
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Money

Re-Teach		

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on understanding decimal notation for fractions and comparing decimal fractions by clarifying mathematical ideas and/or concepts through a short mini-lesson because students will need mathematical ideas clarified. Students tend to generalize numbers. For example, they might think 1/100 is greater than 1/10 because 100 is greater than 10. Revisiting these ideas and making clarification of these concepts will help students.
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 understanding decimal notation for fractions and comparing decimal fractions by addressing conceptual understanding because students who struggle with fractions need support with concrete models. Using base ten blocks, place value charts, or hundreds blocks that students can color in to show the fractions help students build visual pictures and strengthen conceptual understanding.

Extension	
Essential Question	***Examples***
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 understanding decimal notation for fractions and comparing decimal fractions because students who have extensive practice with fractional decimals can quickly move from fraction to decimal form (and vice versa). This can extend to adding and subtracting fractional decimals within word or real-world problems. This type of work would not extend students into different standards but build fluency for later work with decimals and fractions.

New Mexico Instructional S
4th Grade Geometry G

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

The NMIS is a teacher-influenced tool, designed to provide instructional planning support at the programmatic level for districts and instructional level for teachers. Its foundation stems from the vision and mission of the PED and came into existence to assure that students in NM will be engaged in a culturally and linguistically responsive educational system that meets the social, emotional, and academic needs of ALL students. This is also rooted in the belief that all students must have access to on-grade-level standards, focusing on acceleration. The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

Standards are defined as the most critical prerequisite skills and knowledge. This document is color-coded to reflect both anchor and priority standards. Though previous emphasis was placed on priority standards to address lost learning due to COVID-19, New Mexico teachers should note that moving forward, while priority standards allow for acceleration of learning, all standards should be addressed in instruction throughout the school year.

In this guide you will find:

- A breakdown of each of the grade level standards within the cluster, including:
    - Standards of Mathematical Practice
    - Common Misconceptions
    - Identification of Priority Standards, as identified by NMPED.
    - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student Discourse Guide
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
  - 4.G.A.1
  - 4.G.A.2
  - 4.G.A.3

Grade	*CCSS Domain*	*CCSS Cluster*
4	Geometry	Draw and identify lines and angles, and classify by properties of their lines and angles.

Cluster Standard: 4.G.A.1

Standard	Standards for Mathematical Practice
Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two dimensional figures.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Points, lines, segments, rays, and angles are the building blocks of the geometry. Point and line are undefined terms because they do not have definitions. We can understand these terms by thinking of examples of what a point and line might look like. A point can be a tip of a pencil; it has position but no dimension. Euclid described a line by saying that through any two points there is always a line and every line contains at least two points. Line segment is part of a line and it contains two endpoints meaning it has a beginning and endpoints. A line contains an infinite number of points and has no endpoints and goes on and on forever. A ray is part of a line that has one endpoint and extends forever in only one direction. Parallel lines are lines that never cross and are the same distance apart. Perpendicular lines intersect to form right angles. Essential vocabulary for this standard includes: point, line, line segment, ray, parallel lines, perpendicular lines, intersecting lines, and endpoint.	• Draw/identify points, lines, line segments. • Draw/identify rays. • Draw/identify angles (right, acute, obtuse). • Draw/identify perpendicular lines. • Draw/identify parallel lines.
DOK	**Blooms**

1-2	Apply, Understand

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Geometry**	**Draw and identify lines and angles, and classify by properties of their lines and angles.**

Cluster Standard: 4.G.A.2

Standard	**Standards for Mathematical Practice**
Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 5:** Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to describe parallel and perpendicular lines. Students need to classify 2D figures based on parallel and/or perpendicular line segments as well as classify them by their angles. Students need to be able to classify triangles by their angles and by their side lengths. Essential vocabulary for this standard includes: parallel, perpendicular, acute, obtuse, right, right triangle, isosceles, scalene, equilateral, and equiangular.	• Classify 2D figures with parallel lines. • Classify 2D figures with perpendicular lines. • Recognize 2D figures based on angle size. • Recognize and identify right triangles.
DOK	**Blooms**
1-2	Understand

Grade	CCSS Domain	CCSS Cluster
4	Geometry	Draw and identify lines and angles, and classify by properties of their lines and angles.

Cluster Standard: 4.G.A.3

Standard	Standards for Mathematical Practice
Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line symmetric figures and draw lines of symmetry.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to recognize a line of symmetry. A line of symmetry divides a figure into two congruent mirrored parts. A figure may have multiple lines of symmetry. The folded line is called a line of symmetry. A figure is symmetrical if it has a line of symmetry. This standard also requires students to identify figures with line symmetry. Students are required to draw lines of symmetry within figures. Essential vocabulary for this standard includes symmetrical, symmetry, and line of symmetry.	• Recognize line symmetry in 2D figures as a folded line creating two matching parts. • Identify 2D figures with line symmetry. • Draw lines of symmetry in 2D figures. • Identify that 2D shapes can consist of more than one line of symmetry.
DOK	**Blooms**
1-2	Understand

Common Misconceptions

• Students may confuse lines, line segments, and	• Students may confuse the types of triangles.

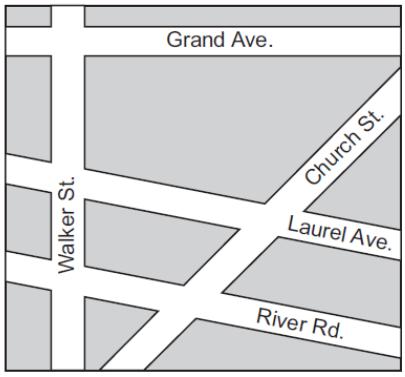
rays. ● Students may confuse acute and obtuse angles. ● Students may confuse perpendicular and parallel lines.	● Students may confuse matching parts that are created by halving then rotating a part of the 2D figure. Halves must fold over to match. No other movement is allowed to create a line of symmetry. ● Students may think figures can only have one line of symmetry; some figures have more than one line of symmetry. Some figures do not have any lines of symmetry.

ASSESSMENT GUIDE

- Draw and identify lines and angles, and classify shapes by properties of their lines and angles

Grade	*CCSS Domain*	*CCSS Strand*
4	Geometry	Draw and identify lines and angles, and cla shapes by properties of their lines and ang
	Sample Task #1 (Constructed Response)	
	Draw three points on your grid paper so that, when connected, they form a triangle. Use your straightedge to connect the three points to form a triangle. Switch papers with your partner. Determine how the triangle your partner constructed can be classified: right, acute, obtuse, equilateral, isosceles, or scalene. a. How can you classify your partner's triangle? b. What attributes did you look at to classify the triangle? c. What tools did you use to help draw your triangle and classify your partner's triangle?	
	Sample Task #2 (Multiple Choice)	

. A map of streets is shown.



Which two streets are parallel?

Ⓐ Grand Ave. and Walker St.
Ⓑ Grand Ave. and Church St.
Ⓒ Laurel Ave. and Grand Ave.
Ⓓ Laurel Ave. and River Rd.

MLSS AND CLR GUIDE

- Draw and identify lines and angles, and classify shapes by properties of their lines and angles

CCSS Domain	*CCSS Cluster*
Geometry	Draw and identify lines and angles, and classify shapes by propert lines and angles

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles, 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 the different ways we use lines, angles and shapes within different careers (construction, farming, engineering). This could also be extended to shapes found in different cultural aspects (pottery, ceremonial dress, etc.)
Cross-Curricular Connections	Science: In fourth grade the NGSS recommends students will study waves and their application in technology for transfer. Students will identify rays and angles in drawings of wave propagation. The NGSS also recommends students recognize symmetry, or lack of symmetry, in the internal and external structures of plants and animals.

Validate/Affirm/Build/ Bridge	• *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?* • *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?*	• Equity Based Practice (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 drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles the use of mathematical representations within the classroom is critical because students can draw on their own knowledge based on cognates, and can 80 6 express their knowledge, questions, and reasoning using multiple representations. For example, a student might make the connection between parallel and paralela, and be able to represent parallel lines with the symbol II.

Planning for Multilayered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to recognizing attributes of quadrilaterals, including parallel lines and right angles. **(3.G.1)** • Connect to identifying and distinguishing between attributes and non-attributes of trapezoids, squares, rectangles, circles, hexagons, rhombuses and parallelograms and had to build and draw shapes that possess	• Connect to recognizing angles as geometric figures that form wherever two rays share a common endpoint, and understand concepts of angle measurement. **(4.MD.5)**	• Connect to understanding attributes belonging to a category of two-dimensional figures belonging to subcategories of that category. **(5.G.3)** • Connect to classifying two-dimensional figures based on properties. **(5.G.4)** • Connect to understanding reflection, rotation, and

these attributes. **(2.G.1)** ● Connect to partitioning shapes into halves. **(2.G.3, 2.G.3)**		translation. **(8.G.2)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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 new mathematical language when studying drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles because this is the first time that students are exposed to rays, angles, and perpendicular and parallel lines, and these are the building blocks of geometry, so a strong foundational understanding is crucial. This cluster has vocabulary that is cluster specific. Many of these vocabulary words are new, but some are reviewed from previous grade levels. Students need practice in using and interacting with mathematical language and embedding vocabulary for this cluster.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	2.G.A.1: This standard provides a foundation for work with drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles because this is where students are introduced to recognizing that different figures have different attributes, including angles and lines. 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.

Re-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles by clarifying mathematical ideas and/or concepts through a short mini-lesson because students develop explicit awareness of and vocabulary for many

		concepts they have been developing, including points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines, and clarifying these terms will help students form richer concept images connected to verbal definitions.
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 drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles by confronting student misconceptions because general misunderstandings regarding specific attributes exist when student are not exposed to multiple opportunities to see shapes visually.

Extension	
Essential Question	***Examples***
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 open ended tasks linking multiple disciplines when studying drawing and identifying lines and angles, and classifying shapes by properties of their lines and angles because it is important for students to link such an abstract concept into concrete situations. Students can use their knowledge of shapes and attributes to design a room/building/city, use their knowledge of lines and engineer a road system for a town, etc.

New Mexico Instructional Scope

4th Grade Measurement and Data Guide

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

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New Mexico Instructional Scope

4th Grade Measurement and Data Guide

Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Solve problems involving measurement and conversion of measurements
  - 4.MD.A.1
  - 4.MD.A.2
  - 4.MD.A.3
- Represent and interpret data
  - 4.MD.B.4
- Geometric measurement: understand concepts of angle and measure angles
  - 4.MD.C.5
  - 4.MD.C.6
  - 4.MD.C.7

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Solve problems involving measurement and conversion of measurements**

Cluster Standard: 4.MD.A.1

Standard	Standards for Mathematical Practice
Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36) ...	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Relating units within the metric system is another opportunity to think about place value. For example, students need to be able to create a table that shows measurements of the same lengths in centimeters and meters.	• Recognize the relationship between kilometers, meters, and centimeters. • Recognize the relationship between yards, feet, and inches. • Recognize the relationship between pounds and ounces. • Recognize the relationship between hours, minutes, and seconds. • Recognize the relationship between liters and milliliters. • Express measurements in a large unit in terms of a smaller unit by recording measurements equivalent in a two-column table.
DOK	**Blooms**
1	Remember, Understand

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Solve problems involving measurement and conversion of measurements**

Cluster Standard: 4.MD.A.2

Standard	Standards for Mathematical Practice
Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 4:** Model with mathematics. • **SMP 6**: Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students combine competencies from different domains as they solve measurement problems using all four arithmetic operations: addition, subtraction, multiplication, and division. For example, “How many liters of juice does the class need to have at least 35 cups if each cup takes 225 ml?” Students may use tape or number line diagrams for solving such problems (MP1).	• Solve word problems involving elapsed time, liquid volume, mass and money involving the operations of addition, subtraction, multiplication and division and including whole numbers, fractions and decimals within the 4th Grade Standards. • Represent a word problem involving elapsed time, liquid volume, mass or money using a diagram that features a measurement scale, such as number line diagrams. • Express measurements in a large unit in terms of a smaller unit by recording measurements equivalent in a two-column table.
DOK	**Blooms**
1-2	Understand, Apply and Analyze

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Solve problems involving measurement and conversion of measurements**

Cluster Standard: 4.MD.A.3

Standard	Standards for Mathematical Practice
Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 7:** Look for and make use of structure. • **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Such abstraction and use of formulas underscores the importance of distinguishing between area and perimeter in Grade 3 (3.MD.8 3) and maintaining the distinction in Grade 4 and later grades, where rectangle perimeter and area problems may get more complex and problem solving can benefit from knowing or being able to rapidly remind oneself of how to find an area or perimeter. By repeatedly reasoning about how to calculate areas and perimeters of rectangles, students can come to see area and perimeter formulas as summaries of all such calculations (MP8).	• Apply the area formula to real-world and mathematics problems. • Apply the perimeter formula to real-world and mathematical problems. • Find an unknown length or width in an area problem by recognizing the area formula as a multiplication equation with an unknown factor. • Find an unknown length or width in a perimeter problem by recognizing the perimeter formula as an addition equation with an unknown factor.
DOK	**Blooms**
1-2	Understand, Apply and Analyze

Common Misconceptions	
• Students may believe that larger units will give larger measures (as opposed to the larger the unit, the smaller the number you get when you measure).	• Students may confuse area and perimeter.

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Represent and interpret data**

Cluster Standard: 4.MD.B.4

Standard	Standards for Mathematical Practice
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively. • **SMP 5:** Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Grade 4 students learn elements of fraction equivalence and arithmetic, including multiplying a fraction by a whole number and adding and subtracting fractions with like denominators. Students can use these skills to solve problems, including problems that arise from analyzing line plots. For example, with reference to the line plot above, students might find the difference between the greatest and least values in the data. (In solving such problems, students may need to label the measurement scale in eighths so as to produce like denominators. Decimal data can also	• Identify benchmark fractions. • Make a line plot to display a data set of measurements in fractions of a unit. • Solve problems involving information presented in line plots which use fractions of a unit by adding and subtracting fractions.

be used in this grade.)	
DOK	**Blooms**
1-2	Remember, Apply

Common Misconceptions

• Students may not understand that it is possible to graph with fractions.	

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Geometric measurement: understand concepts of angle and measure angles**

Cluster Standard: 4.MD.C.5

Standard	**Standards for Mathematical Practice**
4.MD.C.5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: • 4.MD.C.5.A: An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. • 4.MD.C.5.B: An angle that turns through n one-degree angles is said to have an angle measure of n degrees	• **SMP 4:** Model with mathematics. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**

• As with length, area, and volume, children need to understand equal partitioning and unit iteration to understand angle and turn measure. Whether defined as more statically as the measure of the figure formed by the intersection of two rays or as turning, having a given angle measure involves a relationship between components of plane figures and therefore is a property.	• Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint. • Relate angle measurement to circles. • Demonstrate acute, obtuse, and right angles. • Use precise vocabulary when describing angles.
DOK	**Blooms**
1	Remember, Understand

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Geometric measurement: understand concepts of angle and measure angles**

Cluster Standard: 4.MD.C.6

Standard	**Standards for Mathematical Practice**
Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	• **SMP 4:** Model with mathematics. • **SMP 5:** Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• If examples and tasks are not varied, students can develop incomplete and inaccurate notions. For example, some come to associate all slanted lines with 45 degree measures and horizontal and vertical lines with measures of 90 degrees. Others believe angles can be “read off” a protractor in “standard” position, that is, a base is horizontal, even if neither arm of the angle is horizontal. Measuring and then sketching many angles with no horizontal or vertical arms, perhaps initially using circular 360 protractors, can help students	• Recognize that angles are measured in degrees. • Measure angles in whole-number degrees using a protractor. • Make sketches of specified angle measures. • Observe that the orientation of an angle does not affect its measure.

avoid such limited conceptions.	
DOK	**Blooms**
2	Understand, Apply

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Measurement and Data**	**Geometric measurement: understand concepts of angle and measure angles**

Cluster Standard: 4.MD.C.7

Standard	**Standards for Mathematical Practice**
Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	• **SMP 1:** Make sense of problems and persevere in solving them. • **SMP 2:** Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students with an accurate conception of angle can recognize that angle measure is additive. As with length, area, and volume, when an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Students can then solve interesting and challenging addition and subtraction problems to find the measurements	• Recognize angles as additive. • Solve addition and subtraction problems involving unknown angles. • Write an equation for a word problem involving angle measurement and represent the unknown number with a symbol.

of unknown angles on a diagram in the real world and mathematical problems.	
DOK	**Blooms**
1-2	Understand, Apply and Analyze

Common Misconceptions

● Students may think the size of an angle's arms or rays affects its measure. ● Students may think you can only use a protractor when there is a horizontal line.	● Students may think the direction of an angle matters.

ASSESSMENT GUIDE

- Solve problems involving measurement and conversion of measurements
- Represent and interpret data
- Geometric measurement: understand concepts of angle and measure angles

Grade	*CCSS Domain*	*CCSS Strand*
4	**Measurement and Data**	**Solve problems involving measurement and conversion of measurements**

Sample Task #1 (Constructed Response)

Amy has a vegetable garden and a flower garden. Both gardens are in the shape of rectangles.

- The vegetable garden has a length of 10 feet and a width of 4 feet.
- The flower garden has a length of 12 feet and an area of 60 square feet.

What is the total area, in square feet, of Amy's vegetable garden?

Sample Task #2 (Multiple Choice)

Dylan gets home from school at 4:15 p.m. He spends 20 minutes on his homework and 15 minutes playing the drums. Then, he has free time. Dylan has to leave for soccer practice at 5:15 p.m. How many minutes of free time does he have before leaving for soccer practice?

A. 25 minutes
B. 35 minutes
C. 40 minutes
D. 60 minutes

Grade	*CCSS Domain*	*CCSS Strand*
4	**Measurement and Data**	**Represent and interpret data**

Sample Task #1 (Constructed Response)

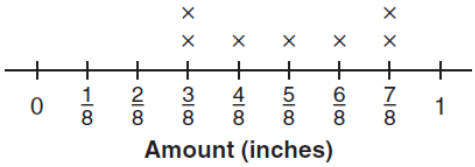
The chart to the right shows the distance fourth graders in Ms. Smith's class were able to run before stopping for a rest. Create a line plot to display the data in the table.

Student	Distance (in miles)
Joe	$2\frac{1}{2}$
Arianna	$1\frac{3}{4}$
Bobbi	$2\frac{1}{8}$
Morgan	$1\frac{5}{8}$
Jack	$2\frac{5}{8}$
Saisha	$2\frac{1}{4}$
Tyler	$2\frac{2}{4}$
Jenny	$\frac{5}{8}$
Anson	$2\frac{2}{8}$
Chandra	$2\frac{4}{8}$

	Sample Task #2 (Multiple Choice)

2. This line plot shows the amount of rainfall each day last week.

Rainfall Last Week



What was the total amount of rainfall last week?

Ⓐ $\frac{25}{8}$ inches

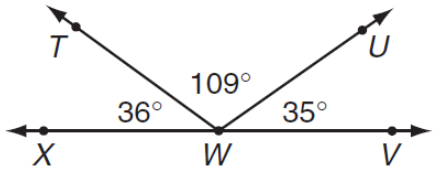
Ⓑ $\frac{28}{8}$ inches

Ⓒ $\frac{35}{8}$ inches

Ⓓ $\frac{36}{8}$ inches

Grade	*CCSS Domain*	*CCSS Strand*
4	**Measurement and Data**	**Geometric measurement: understand concepts of angle and measure angles**
	Sample Task #1 (Constructed Response)	
	Predict the measure of $\angle XYZ$ using your right-angle template. Then, find the actual measure of $\angle XYZ$ using a circular protractor and 180° protractor. Compare with your partner when you are finished.	
	Sample Task #2 (Multiple Choice)	

This diagram shows different angles.



What is the measure, in degrees, of $\angle TWV$?

Ⓐ 71
Ⓑ 74
Ⓒ 144
Ⓓ 145

MLSS AND CLR GUIDE

- Solve problems involving measurement and conversion of measurements
- Represent and interpret data
- Geometric measurement: understand concepts of angle and measure angles

CCSS Domain	*CCSS Cluster*
Measurement and Data	**Solve problems involving measurement and conversion of measurements**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on solving problems involving measurement and conversion of measurements, 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 finding measurement of family garden, backyard or any space that is accessible from home so that there is relevance in finding measurement (finding the area or perimeter of the garden).
Cross-Curricular Connections	Science: In fourth grade the NGSS recommends students work with measurement related to erosion. Consider providing a connection for students to determine the area of vegetation in a certain place. Language Arts: Literature can offer connections about area and perimeter such as: Spaghetti and Meatballs for All by Marilyn Burns.

Validate/Affirm/Build/ Bridge	• *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?* • *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?*	• Equity Based Practice (Posing Purposeful Questions): CLRI requires intentional planning around the questions posed in a mathematics classroom. It is critical to consider "who is being positioned as competent, and whose ideas are featured and privileged" within the classroom through both the types of questioning and who is being questioned. Mathematics classrooms traditionally ask short answer questions and reward students that can respond quickly and correctly. When questioning seeks to understand students' thinking by taking their ideas seriously and asking the community to build upon one another's ideas a greater sense of belonging in mathematics is created for students from marginalized cultures and languages. For example, when studying solving problems involving measurement and conversion of measurements, the pattern of questions within the classroom is critical because it is important to include every student in conversation to elicit their understanding and prior knowledge of content. Allowing students to collaborate will promote a culture of productive talk and allow students to express their thinking which is relevant to their life experiences. Students have the opportunity to take ownership of their learning and sense making of intended content. Through discussion, multiple strategies can evolve for students to utilize.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to measuring lengths with halves and fourths of an inch. **(3.MD.4)** • Connect to estimating, measuring, adding , and subtracting lengths using inches, feet, yards, centimeters, and meters. **(2.MD.1-6)** • Connect to measuring and estimating masses of objects	• Connect to interpreting a multiplication equation as a comparison. **(4.OA.1)** • Connect to multiplying to solve word problems involving multiplicative comparisons. **(4.OA.2)**	• Connect to using unit conversions in solving multi-step, real world problems. **(5.MD.1)** • Connect to using ratio reasoning to convert measurement units; connect to manipulating and transforming units appropriately when multiplying or dividing quantities. **(6.RP.3.d)**

using grams and kilograms and liquid volumes using milliliters and liters. **(3.MD.2)** ● Connect to measuring and estimating; and to adding, subtracting, multiplying, or dividing to solve one-step word problems given the same units. **(3.MD.2)** ● Connect to telling and writing time to the nearest minute. Connect to adding and subtracting time intervals in minutes using number line diagrams. **(3.MD.1)**		

Suggested Instructional Strategies		
Pre-Teach		
Level of Intensity	***Essential Question***	***Examples***
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, solving problems involving measurement and conversion of measurements because students need to understand the basic foundations of content being covered in this standard. This includes measurement names, abbreviations, and prior work in word problems. Eliciting prior learning will help in understanding what students already know and what needs to be covered more thoroughly.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.MD.A.2: This standard provides a foundation for work with solving problems involving measurement and conversion of measurements from a larger unit to a smaller unit because it is essential for students to understand and be able to solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. 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.

Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on solving problems involving measurement and conversion of measurement from a larger unit to a smaller unit, by revisiting student thinking through a short mini-lesson because it is essential for students to be able to explain their thinking and reasoning behind it to portray understanding and learning of content. Revisiting student thinking will also allow the teacher to clear up misconceptions or student thinking that is not based on measurement.
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 to solve problems involving measurement and conversion of measurement from a larger unit to a smaller unit by addressing conceptual understanding because first students need to understand what they are doing and the why so sense making of the intended content is developed with an understanding and building on their knowledge. Students will need explicit work with concrete materials to build conceptual understanding. For example, using centimeter blocks to see that 100 centimeters equals one meter.

Extension	
Essential Question	***Examples***
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 explore links between various topics when studying and solve problems involving measurement and conversion of measurement from a larger unit to a smaller unit because this will allow students to make connections to prior learning and build on their understanding and knowledge of measurement and data.

CCSS Domain	*CCSS Cluster*
Measurement and Data	**Represent and interpret data**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on representing and interpreting data, 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, students can gather data at home, discuss data tables with parents, or discuss other topics that can be used to gather information for data tables.	
Cross-Curricular Connections	Science: In fourth grade the NGSS recommends students "develop a model of waves to describe patterns in terms of amplitude and wavelength". Consider providing a connection for students to determine the length of various waves that measure in fractional units. Then have students graph and analyze that data. Social Studies: In fourth grade the New Mexico Social Studies Standards state students should "understand how visual data (e.g., maps, graphs, diagrams, tables, charts) organizes and presents geographic information." Consider having students gather, graph and analyze geographic data that contains measurements in fractions of a unit and can be displayed using a line plot. Consider providing opportunities to consider what type of data suits a line plot best.	
Validate/Affirm/Build /Bridge	• *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?* • *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*	• Equity Based Practice (Building Procedural Fluency from Conceptual Understanding): Instruction should build from conceptual understanding to allow students opportunities to make meaning of mathematics before focusing on procedures. When new learning begins with procedures it privileges those with strong prior familiarity with school mathematics procedures for solving problems and does not allow learning to build for more methods for solving tasks that occur outside of school mathematics. For example, when studying representing and interpreting data the types of mathematical tasks are critical because this cluster deals with collection of data, creating line plots based on fractions, and interpreting data from a data table. These mathematical concepts need procedural and conceptual understanding. Students need to understand how to set up a number line that will represent their data, this includes fractional measurements. Students need understanding in

	support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?	fractions and fraction measurements to be able to properly step up number lines in creating the line plot. Conceptual understanding comes through concrete work with these mathematical concepts.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to generating measurement data and making line plots using whole number units. **(2.MD.9)** • Connect to generating measurement data by measuring lengths using rulers marked with halves and fourths of an inch and showing the data by making a line plot where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters. **(3.MD.4)** • Connect to understanding line plots represent measurement data, not categorical data. **(3.MD.3-4)**	• Connect to using the four operations to solve word problems, including simple fractions and representing measurement quantities using diagrams. **(4.MD.2)** • Connect to explaining why fractions are equivalent and generating equivalent fractions. **(4.NF.1)** • Connect to adding and subtracting mixed numbers with like denominators. **(4.NF.3c)**	• Connect to making line plots with measurements to the half, quarter, and eighth of a unit and solving problems involving operations of fractions. **(5.MD.2)** • Connect to solving real world problems involving the addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. **(5.NF.2)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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, representing and interpreting data because students will have created line plots representing whole, halves, and fourths.

Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.MD.B.4: This standard provides a foundation for work with representing and interpreting data because students will have previous work with measuring to halves and fourths then creating line plots with this information. 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.

Re-Teach

Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on representing and interpreting data by providing specific feedback to students on their work through a short mini-lesson because students will need feedback for mistakes they are making with creating or interpreting line plots. Attending precision with setting up line plots.
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 representing and interpreting data by confronting student misconceptions because if students can set up line plots, it is important to look at the misconceptions that still have students. This will allow the teacher to isolate issues and work with the student in that area.

Extension

Essential Question	***Examples***
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 in-depth, self-directed exploration of self-selected topics when studying representing and interpreting data because students can explore where these types of data tables would be used or generate them from given information.

CCSS Domain	*CCSS Cluster*
Measurement and Data	**Geometric measurement: understand concepts of angle and measure angles**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on geometric measurement: understand concepts of area and relate area to multiplication and to addition, 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 utilizing vocabulary cards with visuals to present the geometric shape to explain the concept of area. Students can then understand the area as how much two-dimensional space a shape takes up and then practice by using addition to counting individual square units or by multiplying the length and width of the shape. Students can use repeated addition to support their multiplication skills.	
Cross-Curricular Connections	Social Studies: In fourth grade the New Mexico Social Studies Standards state students should “explain how the Earth-Sun relationships produce day and night”. Consider providing a connection to the angle of Earth’s axis in relation to the Sun. Language Arts: Literature can offer connections about angles such as: What’s Your Angle, Pythagoras? by Julie Ellis or The Adventures of the Angles by Kristie Carpenter.	
Validate/Affirm/Build/Bridge	• *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?* • *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*	• Equity Based Practice (Goal Setting): Setting challenging but attainable goals with students can communicate the belief and expectation that all students can engage with interesting and rigorous mathematical content and achieve in mathematics. Unfortunately, the reverse is also true, when students encounter low expectations through their interactions with adults and the media, they may see little reason to persist in mathematics, which can create a vicious cycle of low expectations and low achievement. For example, when studying geometric measurement: understand concepts of angle and measure angles, goal setting is critical because it is recognizing important concepts that allows for the teacher to create a clear plan. Teachers are encouraged to think critically about students' cultural background, strengths and weaknesses. Teacher is then looking at the students' individual needs to plan accordingly so that students reach their end goal.

	creating mathematical identities as capable mathematicians that can use mathematics within school and society?	

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to understanding that shapes in different categories may share attributes. **(3.G.1)** • Connect to recognizing and drawing shapes having specified attributes, such as a given number of angles. **(2.G.1)** • Connect with using addition and subtraction within 100 to solve one-and two-step word problems. **(2.OA.1)** • Connect to finding the unknown whole number using addition and subtraction. **(1.OA.8)**	• Connect to drawing and identifying lines and angles. **(4.G.1)** • Connect to classifying two-dimensional figures based on lines and angles. **(4.G.2)**	• Connect to constructing triangles from three measures of angles. **(7.G.2)** • Connect to using facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to writing and solving simple equations for an unknown angle in a figure. **(7.G.5)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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 geometric measurement: understand concepts of angle and measure angles because students will need to know how to draw and label line segments.

Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	4.G.A.1: This standard provides a foundation for work with drawing and identifying lines and angles and classifies shapes by properties of their lines and angles because students need to be able to draw and recognize angles. 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.
Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on geometric measurement: understand concepts of angle and measure angles by clarifying mathematical ideas and/or concepts through a short mini-lesson because students need to be able to recognize angles and recognize the degrees each angle represents.
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 understanding concepts of angle and measure angles by addressing conceptual understanding because students who continue to struggle will need support with building conceptual understanding. This might include work with manipulatives or real-world examples.
Extension		
Essential Question		***Examples***
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 explore links between various topics when studying, understand concepts of angle and measure angles because this cluster can be cross curricular and have ties to real world examples. Students can explore these links.

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

The NMIS is a teacher-influenced tool, designed to provide instructional planning support at the programmatic level for districts and instructional level for teachers. Its foundation stems from the vision and mission of the PED and came into existence to assure that students in NM will be engaged in a culturally and linguistically responsive educational system that meets the social, emotional, and academic needs of ALL students. This is also rooted in the belief that all students must have access to on-grade-level standards, focusing on acceleration. The purpose of this tool is to help educators understand each of the grade level standards and how those standards connect to the students' overall preparation for college and career readiness.

Standards are defined as the most critical prerequisite skills and knowledge. This document is color-coded to reflect both anchor and priority standards. Though previous emphasis was placed on priority standards to address lost learning due to COVID-19, New Mexico teachers should note that moving forward, while priority standards allow for acceleration of learning, all standards should be addressed in instruction throughout the school year.

In this guide you will find:

- A breakdown of each of the grade level standards within the cluster, including:
    - Standards of Mathematical Practice
    - Common Misconceptions
    - Identification of Priority Standards, as identified by NMPED.
    - Level of Rigor Identification
- Sample aligned assessment items
- Suggested Student Discourse Guide
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Key		
	Priority Standard	Priority standards, as identified by NMPED, are denoted with red highlighting. Priority standards are the most critical prerequisite skills and knowledge a student needs. This does not mean that these are only standards required to be taught, just these are the standards that will allow for the acceleration the students of New Mexico need during this time.
	*Conceptual Understanding*	Conceptual Understanding standards help students build a deep understanding of the **how** and **why** of mathematics.
	*Application*	Application standards help students identify the appropriate concepts and skills to tackle **novel real-world problems.**
	*Procedural Skill and Fluency*	Procedural standards help students develop **efficiency** and **accuracy** in computations.

Standards Breakdown

- Generalize place value understanding for multi-digit whole numbers
  - 4.NBT.A.1
  - 4.NBT.A.2
  - 4.NBT.A.3
- Use place value understanding and properties of operations to perform multi-digit arithmetic
  - 4.NBT.B.4
  - 4.NBT.B.5
  - 4.NBT.B.6

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Generalize place value understanding for multi-digit whole numbers**

Cluster Standard: 4.NBT.A.1

Standard	Standards for Mathematical Practice
Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.	• **SMP 2**: Reason abstractly and quantitatively.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10. In this standard, students should reason about the magnitude of digits in a number. Students should be given opportunities to reason and analyze the relationships of numbers that they are working with.	• Recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. • Understand that a quantitative relationship exists between the digits in place value positions of a multi-digit number. • Explain that a digit in one place represents ten times what it would represent in the place to its right.
DOK	**Blooms**
1-2	Understand

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Generalize place value understanding for multi-digit whole numbers**

Cluster Standard: 4.NBT.A.2

Standard	Standards for Mathematical Practice
Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to read and write multi-digit whole numbers using numerals (standard form), word form, and expanded form. It also requires students to compare 2 multi-digit whole numbers (based on place value meaning) using the symbols <, >, =. Be mindful when teaching not to teach a number is larger because it has more digits or a number is smaller because it has fewer digits. This will confuse students when they move into comparing decimal numbers.	• Explain the difference between standard, word, and expanded forms. • Read multi-digit whole numbers using base-ten numerals, number names, and expanded form. • Write multi-digit whole numbers using base-ten numerals, number names, and expanded form. • Compare two multi-digit numbers and write the comparison using symbols.
DOK	**Blooms**
1-2	Apply

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Generalize place value understanding for multi-digit whole numbers**

Cluster Standard: 4.NBT.A.3

Standard	Standards for Mathematical Practice
Use place value understanding to round multi-digit whole numbers to any place.	• **SMP 3**: Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The standard requires students to use place value to round with any given whole number to any given place value. The standard focuses on using place value. Students need to use visual models or manipulatives when learning to round numbers so they understand the mathematical reasoning for rounding up or down. A number line may be a good visual when rounding.	• Explain the role of place value when rounding whole numbers. • Round multi-digit whole numbers to any place.
DOK	**Blooms**
1-2	Apply

Common Misconceptions

• Students may struggle with numbers such as one thousand two. Many students will understand the 1000 and the 2 but then instead of placing the 2 in the ones place, students will write the numbers as they hear them, 10002 (ten thousand two). • Students often assume that the first digit of a multi-digit number indicates the "greatness" of a number. The assumption is made that 954 is greater than 1002 because students are focusing on the first digit instead of the number as a whole.	• Students may get confused when rounding to specific place values. For example, when asked to round 712 to the nearest ten, they may round to the nearest hundred. Students need work with number lines and other mathematical tools to help build this understanding of rounding.

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Use place value understanding and properties of operations to perform multi-digit arithmetic**

Cluster Standard: 4.NBT.B.4

Standard	Standards for Mathematical Practice
Fluently add and subtract multi digit whole numbers using the standard algorithm.	• **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• The standard requires students to add and subtract multi-digit whole numbers using the standard algorithm. Students who struggle with the algorithm need more experience with hands-on materials. Scaffolding students with place value understanding will help students with regrouping misconceptions.	• Fluently use standard algorithms to add multi-digit whole numbers. • Fluently use the standard algorithm to subtract multi-digit whole numbers.
DOK	**Blooms**
1-2	Apply

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Use place value understanding and properties of operations to perform multi-digit arithmetic**

Cluster Standard: 4.NBT.B.5

New Mexico Instructional Scope

4th Grade Numbers and Operations in Base Ten Guide

Standard	Standards for Mathematical Practice
Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	• **SMP 3:** Construct viable arguments and critique the reasoning of others. • **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• This standard requires students to multiply up to 4 digits by 1 digit and 2 digits by 2-digit numbers using place value AND the properties of operations. Students may calculate using equations, rectangular arrays, AND/OR area models. Properties of operations: commutative, associative, distributive. Previous grade level standards focused on using place value and properties of operations. Also, students often do not notice the need of borrowing and just take the smaller digit from the larger one. Emphasize place value and the meaning of each of the digits. Specific strategies or students having difficulty with lining up similar place values in numbers as they are adding and subtracting.	• Explain the role of place value and the properties of operations when multiplying multi-digit numbers. • Solve multi-digit multiplication problems.
DOK	**Blooms**
1-2	Apply, Understand

Grade	*CCSS Domain*	*CCSS Cluster*
4	**Numbers and Operations in Base Ten**	**Use place value understanding and properties of operations to perform multi-digit arithmetic**

Cluster Standard: 4.NBT.B.6

Standard	Standards for Mathematical Practice
Find whole-number quotients and remainders with up to four-digit dividends and one-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 3:** Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**

• General methods for computing quotients of multi-digit numbers and one-digit numbers rely on the same understanding as for multiplication, but cast in terms of division. One component is quotients of multiples of 10, 100, or 1000 and one-digit numbers. Another component of understanding general methods for multi-digit division computation is the idea of decomposing the dividend into base-ten units and finding the quotient unit by unit, starting with the largest unit and continuing on to smaller units. As with multiplication, this relies on the distributive property. This work can be done through methods such as partial quotients or area models for division.	• Find whole number quotients with up to 4-digit dividends and 1-digit divisors using strategies based on place value, properties of the operations, AND/OR the relationship between multiplication and division.
	• Students can successfully use one of the following:
	  ○ Illustrate division with equations.
	  ○ Illustrate division with rectangular arrays.
	  ○ Illustrate division with area models.

DOK	**Blooms**
1-2	Understand

Common Misconceptions

• Students may confuse the role of place-value when "regrouping". In addition, students may add 35 + 19 and say the answer is 414. They may add 9 and 5 to get 14 then add 3 and 1 to get 4 and put them together. In subtraction, students may flip numbers in the subtrahend and minuend to make the numbers work to subtract. For example,	• Students DO NOT use the standard algorithm to divide in 4th grade. The standard algorithm is a 6th grade standard. 4th grade should focus on place value, properties, models, etc., to multiply multi-digit numbers. Students who have been taught the algorithm may not understand the importance of place value. They may misapply

for 51-27, a student may think you cannot do 1-7 and may flip it to be 7-1, then subtract 5-2 to get 3, then state the answer is 36. • Students DO NOT use the standard algorithm to divide in 4th grade. Some students may struggle to recognize the place value inherent in multiplication. Do not rush to teach the algorithm, as a knowledge of where the numbers come from is necessary for a full understanding of the algorithm.	the algorithm and get a number that does not make sense. It is important to ensure a full understanding of the importance of place value before even considering the algorithm for multiplication or division.

Student Discourse Guide

- **Purposeful, rich classroom discourse offers students the opportunity to express their ideas, thinking, and to critique the reasoning of others in a variety of ways (writing, drawing, verbal). Purposeful implementation of classroom discourse allows students to activate funds of knowledge and to refine their mathematical understanding. When students have frequent opportunities for discourse they find various paths to solutions and reveal knowledge or misunderstandings to educators. The process also allows educators to honor students' culture, lived experiences and evolving math identities.**
- **Discourse that focuses on tasks that promote reasoning and problem solving is a primary mechanism for developing conceptual understanding and meaningful learning of mathematics (Michaels, O'Connor, and Resnick, 2008)**

Domain: **Numbers and Operations in Base Ten**	Strand: **Generalize place value understanding for multi-digit whole numbers**

Suggested Student Discourse Questions

• In a multi-digit number, the value of the digit to the right is how many times less? • How can we use the value of a digit to	• How do we use our place value knowledge in expanded notation? • How can we use place value to round

compare multi-digit numbers?	numbers? ● What manipulatives or models can you use to represent place value problems more efficiently?

ASSESSMENT GUIDE

- Generalize place value understanding for multi-digit whole numbers
- Use place value understanding and properties of operations to perform multi-digit arithmetic

Grade	*CCSS Domain*	*CCSS Strand*
4	**Numbers and Operations in Base Ten**	**Generalize place value understanding for multi-digit whole numbers**
	Sample Task #1 (Constructed Response)	
	According to their pedometers, Mrs. Alsup's class took a total of 42,619 steps on Tuesday. On Wednesday, they took ten thousand more steps than they did on Tuesday. On Thursday, they took one thousand fewer steps than they did on Wednesday. How many steps did Mrs. Alsup's class take on Thursday?	
	Sample Task #2 (Multiple Choice)	
	In which number is the value of the digit 9 ten times the value of the digit 9 in 359,712? A. 198,457 B. 286,293 C. 743,950 D. 928,614	

Grade	*CCSS Domain*	*CCSS Strand*
4	**Numbers and Operations in Base Ten**	**Use place value understanding and properties of operations to perform multi-digit arithmetic**

	Sample Task #1 (Constructed Response)
	For a play, adult tickets cost $10 and child tickets cost $5. a. On Saturday, 98 adult tickets were sold and 245 child tickets were sold. What was the total amount of money, in dollars, collected from ticket sales on Saturday? Show your work or explain how you know.
	Sample Task #2 (Multiple Choice)
	What is the product of 20 and 36? A. 56 B. 72 C. 360 D. 720

MLSS AND CLR GUIDE

- Generalize place value understanding for multi-digit whole numbers
- Use place value understanding and properties of operations to perform multi-digit arithmetic

CCSS Domain	*CCSS Cluster*
Numbers and Operations in Base Ten	**Generalize place value understanding for multi-digit whole numbers**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on generalizing place value understanding for multi-digit whole numbers, 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, students can gather information from home about ways that parents would use rounding in everyday life. These examples can be shared and explored as tasks that directly relate back to home and culture.
Cross-Curricular Connections	Science: Study of planets' distance from the sun may present an opportunity to connect to concepts of base-10 and place value. Social Studies: Study of populations (state, country, and world) may present an opportunity to connect to concepts of base-10 and place value.

Validate/Affirm/Build /Bridge	• *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?* • *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?*	• Equity Based Practice (Eliciting and Using Evidence of Student Thinking): Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time. For example, when studying generalizing place value understanding for multi-digit whole numbers eliciting and using student thinking is critical because students need to work with very abstract numbers. Students will need to manipulate these numbers by understanding movement between place values and rounding numbers. This work is best done with students working together on tasks to explain and expand thinking through discourse. The teacher can further discourse by asking prompting questions or extending thinking through questions.

Planning for Multi-Layered System of Supports

Vertical Alignment		
Previous Learning	***Current Learning***	***Future Learning***
• Connect to understanding that the three digits of a three-digit number represent amounts of hundreds, tens, and ones **(2.NBT.1)** • Connect to reading and writing numbers to 1,000 using base-ten numerals, number names and expanded form **(2.NBT.3)** • Connect to comparing two three-	• Connect to multiplying a whole number up to four digits by a one-digit whole number, and multiply two two-digit numbers using strategies based on place value **(4.NBT.5)** • Connect to finding whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies	• 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.1)** • Connect to explaining patterns in the numbers of zeros of the product when multiplying a

digit numbers based on meanings of the hundreds, tens, and one's digits, using >, =, and< symbols to record the results of comparisons. **(2.NBT.4)** • Connect to using place value understanding to round two-digit and three-digit numbers to the nearest 10 and 100 **(3.NBT.1)** • Connect to multiplying one-digit whole numbers by multiples of ten **(3.NBT.3)**	based on place value **(4.NBT.6)**	number by powers of 10 **(5.NBT.2)** • Connect to reading, writing, and comparing decimals to thousandths. **(5.NBT.3)** • Connect to using place value understanding to round decimals to hundredths **(5.NBT.4)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	***Essential Question***	***Examples***
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 analyzes common misconceptions when studying generalizing place value understanding for multi-digit whole numbers because students are working with multiples of ten moving from one place value to another. Students that are taught to “just add a zero” when multiplying by ten will not understand mathematically why this works. Similarly, with rules for rounding, students need to understand why we round up from 5 and up. Knowing this rule does not help them, but visually seeing which number is closer will help with rounding.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	2.NBT.A.1: This standard provides a foundation for work with generalizing place value understanding for multi-digit whole numbers because this standard builds student understanding of place values and values of these numbers up to the hundreds place. 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.

Universal Support Framework

A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• A digit in one place represents 10 times more than the place to its right.
• The difference between standard, word, and expanded forms.
• How place value helps round numbers.
• How to identify situations that call for rounding numbers.
	• Read and write numbers to 1,000,000 based on place value understanding.
	• Write numbers using various forms of expanded notation.
	• Compare numbers using place value and <, >, = symbols to show the comparison.
	• Use rounding in a variety of situations, including estimation, solving problems, and determining if their answers make sense.
		• Build on students' experience with the following skills:
		  ○ Understanding of powers of ten
		  ○ Round to the nearest 10 and 100
		  ○ Identify standard forms of numbers
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Place value chart
		  ○ Number line

Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on generalizing place value understanding for multi-digit whole numbers by revisiting student thinking through a short mini-lesson because targeting revisiting of student thinking will allow the teacher to correct misconceptions and/or give more help with conceptual understanding.
Intensive	What assessment data will help identify content needing to be revisited for intensive	For example, some students may benefit from intensive extra time during and after a unit generalizing place value understanding for multi-digit whole numbers by

	interventions?	revisiting student thinking by addressing conceptual understanding because conceptual understanding needs to be built with manipulatives or visual models.

Extension	
Essential Question	***Examples***
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 generalizing place value understanding for multi-digit whole numbers because students need extensive practice to become fluent with multi-digit numbers, including manipulating them and using them in different contexts.

CCSS Domain	*CCSS Cluster*
Numbers and Operations in Base Ten	**Use place value understanding and properties of operations to perform multi-digit arithmetic**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on using place value understanding and properties of operations to perform multi-digit arithmetic, 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, possible examples include: students look for ways they use arithmetic outside of school, students ask family members and/or friends how they use arithmetic in their everyday lives, students look for examples of arithmetic in their daily lives. Students can share their findings with class by: having conversations, creating written and/or visuals in print or non-print formats. As students share with each other, they will make connections.	
Cross-Curricular Connections	Social Studies: Consider giving students an opportunity to study and compare populations in various geographic areas within the state, country, or world. Students can use their understanding of place value to solve real-world problems that require them to compare populations using addition and subtraction.	
Validate/Affirm/Build/ Bridge	• *How can you design your mathematics classroom*	• Equity Based Practice (Goal Setting): Setting challenging but attainable goals with students can

	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? • *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?*	communicate the belief and expectation that all students can engage with interesting and rigorous mathematical content and achieve in mathematics. Unfortunately, the reverse is also true, when students encounter low expectations through their interactions with adults and the media, they may see little reason to persist in mathematics, which can create a vicious cycle of low expectations and low achievement. For example, when studying using place value understanding and properties of operations to perform multi-digit arithmetic goal setting is critical because when students reach goals with adding, subtracting, multiplying, and dividing they realize success which increases math confidence. Multi-digit arithmetic success relies on fluency, and many students may need to continue to work toward fluency.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	***Current Learning***	***Future Learning***
• Connect to fluently adding and subtracting within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **(2.NBT.5)** • Connect to adding and subtracting within 1,000 using concrete models or drawings. **(2.NBT.7)** • Connect to fluently adding and subtracting within 1000 using	• Connect to recognizing that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. **(4.NBT.1)** • Connect to finding whole-number quotients and remainders with up to four-digit dividends and one-digit divisors. **(4.NBT.6)**	• Connect to fluently multiplying multi-digit whole numbers using the standard algorithm. **(5.NBT.5)** • Connect to finding quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies. **(5.NBT.6)** • Connect to adding, subtracting, multiplying, and dividing decimals to hundredths, using concrete models or drawings and

strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **(3.NBT.2)** • Connect to multiplying one-digit whole numbers by multiples of 10 in the range 10–90, for example, 9 × 80 and 5 × 60. **(3.NBT.3)**		strategies. **(5.NBT.7)** • Connect to explaining patterns in the number of zeros of the product when multiplying a number by powers of 1.0 **(5.NBT.2)**

Suggested Instructional Strategies		
Pre-Teach		
Level of Intensity	***Essential Question***	***Examples***
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 place value understanding and properties of operations to perform multi-digit arithmetic because reviewing models used prior to grade 4 will help students move to adding and subtracting using the standard algorithm. Students can use place value models they used for adding and subtracting as they create place value models when multiplying and dividing.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.NBT.A.2: This standard provides a foundation for work with place value understanding and properties of operations to perform multi-digit arithmetic because being able to fluently add and subtract within 1000 using the properties of operations and/or the relationship between addition and subtraction is the foundation for accuracy and understanding of the algorithm. 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.
Universal Support Framework		
A student should know/understand...	A student should be able to do...	***Potential Scaffolds***

• The connection between previous work with addition and subtraction models and representations and efficient algorithms to add and subtract multi-digit numbers.
• Arrays and area models, as well as the properties of multiplication.
• How to extend strategies for multiplication to two two-digit numbers.
• The connection between previous work with division facts to finding compatible numbers.
	• Fluently add and subtract multi-digit whole numbers using one or more strategies.
	• Multiply a number up to four-digits by a one-digit number using a variety of models and strategies.
	• Multiply two two-digit numbers using a variety of models and strategies.
	• Divide a number up to four-digits by a one-digit number using a variety of models and strategies.
		• Build on students' experience with the following skills:
		  ○ Multiplying and dividing single-digit numbers within 100 fluently
		  ○ Adding and subtracting using place value strategies
		  ○ Place value regrouping strategies
		
		• Cognitive Strategies
		  ○ Repeatedly model the strategies
		  ○ Monitor the students' use of the strategies
		  ○ Provide feedback to students
		  ○ Teach self-questioning and self-monitoring strategies
		  ○ Introduce multiple means of representation for mathematical ideas
		
		• Encourage students to use alternative tools to better access the grade level content. Examples include:
		  ○ Place value chart

Re-Teach		
Level of Intensity	***Essential Question***	***Examples***
Targeted	What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisited during a unit?	For example, students may benefit from re-engaging with content during a unit on using place value understanding and properties of operations to perform multi-digit arithmetic by providing specific feedback to students on their work through a short mini-lesson because focusing on solidifying place value understanding will help students when adding and subtracting using the standard algorithm.
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 on using place value understanding and properties of operations to perform multi-digit arithmetic by confronting student misconceptions because identifying and correcting misconceptions with place value understanding is crucial

		to students being successful with adding and subtracting using the standard algorithm as well as using place value understanding to multiply and divide whole numbers.

Extension	
Essential Question	***Examples***
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 open ended tasks linking multiple disciplines when studying using place value understanding and properties of operations to perform multi-digit arithmetic because through working with adding, subtracting, multiplying, and dividing in various curriculum areas, students will not only make connections between math and the real world, but they will also see the value of math in life.