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
- Student Discourse Guide **(only provided for clusters with Conceptual Understanding standards)**
- A multilayered system of supports (MLSS) and culturally and linguistically responsive instruction (CLR) guide

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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

- Represent and solve problems involving multiplication and division
  - CCSS.3.OA.A.1
  - CCSS.3.OA.A.2
  - CCSS.3.OA.A.3
  - CCSS.3.OA.A.4
- Understand properties of multiplication and the relationship between multiplication and division
  - CCSS.3.OA.B.5
  - CCSS.3.OA.B.6
- Multiply and divide within 100
  - CCSS.3.OA.C.7
- Solve problems involving the four operations, and identify and explain patterns in arithmetic
  - CCSS.3.OA.D.8
  - CCSS.3.OA.D.9

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Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Represent and solve problems involving multiplication and division**

Cluster Standard: 3.OA.A.1

Standard	Standards for Mathematical Practice
Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.	● **SMP2:** Reason abstractly and quantitatively. ● **SMP3:** Construct viable arguments and critique the reasoning of others.

Clarification Statement	Students Who Demonstrate Understanding Can...
● Students need to explore and understand the relationship between multiplication and division. ● Equations in the form of a x b = c and c = a x b should be used interchangeably, with the unknown in different positions.	● Demonstrate understanding by representing multiplication with equal groups. ● Represent multiplication with arrays. ● Use repeated addition to represent multiplication. ● Utilize the number line to represent multiplication with equal jumps ● Analysis of operational patterns, grouping patterns, grouping of numbers, arrays, and area-based strategies. ● Apply the standard algorithms and their conceptual basis utilizing drawings and equations. ● Demonstrate algorithms to provide computational efficiency utilizing problem solving and solving problems

DOK	Blooms
1	Remember, Understand

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Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Represent and solve problems involving multiplication and division**

Cluster Standard: 3.OA.A.2

Standard	Standards for Mathematical Practice
Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	● **SMP 2:** Reason abstractly and quantitatively. ● **SMP 3:** Construct viable arguments and critique the reasoning of others.

Clarification Statement	Students Who Demonstrate Understanding Can...
● Students need to explore and understand the relationship between multiplication and division.	● Explain the meaning of division and what the numbers in a division problem represent. ● Explain that a dividend is the number of objects to be shared equally. The divisor is the number of equal shares or the number in each equal share. The quotient is an answer to a division problem. ● Describe the meaning of division and quotients of whole numbers. ● Interpret whole-number quotients of whole numbers. ● Utilize partition division in which you divide an amount into a given number of groups. ● Utilize measurement division which is repeated subtraction division in which you divide an amount into groups of a given size. ● Demonstrate division with manipulatives and other visuals

DOK	Blooms
1	Remember, Understand

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Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Represent and solve problems involving multiplication and division**

Cluster Standard: 3.OA.A.3

Standard	Standards for Mathematical Practice
Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	● **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 will apply their understanding of multiplication and division to identify an unknown in an equation or word problem. This means they will need to apply their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown. The standard requires them to see the solution to an equation on both sides of the equal sign.	● Utilize visuals to represent, interpret, and solve one-step problems involving multiplication and division. ● Solve multiplication word problems by utilizing models, drawings, and equations. ● Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem. ● Solve division word problems with a divisor and quotient utilizing models, drawings, and equations. ● Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem. ● Explain connections of equations solved with their models or drawings to reinforce multiplication and division within 100. ● Develop strategies using models, drawings, and equations to demonstrate student understanding.

DOK	Blooms

2-3	Apply, Analyze

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Represent and solve problems involving multiplication and division**

Cluster Standard: 3.OA.A.4

Standard	Standards for Mathematical Practice
Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?	● **SMP 2:** Reason abstractly and quantitatively. ● **SMP 7:** Look for and make use of structure.

Clarification Statement	Students Who Demonstrate Understanding Can...
● Students will need to determine the unknown number in multiplication and division problems such as the following examples: 8 x 9 = ?, 8 x ? = 48, ? x 3 = 27, 28 ÷ 7 = ?, ? ÷ 6 = 3, 35 ÷ ? = 7	● Explain connections between an equation to a problem. ● Multiply and divide within 100. ● Determine which operation (multiplication or division) is needed to determine the unknown whole number and solve to find the unknown whole number in a multiplication or division equation. ● Apply their understanding to demonstrate their knowledge of the relationship between multiplication and division. ● Examine patterns and use manipulatives as well as drawings to demonstrate their understanding of determining the unknown whole number in a multiplication or division equation.

DOK	Blooms
1-2	Remember, Understand

Common Misconceptions

- Students may think that $3 ÷ 15 = 5$ and $15 ÷ 3 = 5$ are the same equations. The use of models is essential in helping students eliminate this misunderstanding.
- Students may think a symbol used to represent a number once cannot be used to represent another number in a different problem/situation.

- The use of a symbol to represent a number once cannot be used to represent another number in a different problem/situation. Presenting students with multiple situations in which they select the symbol and explain what it represents will counter this misconception.

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Understand properties of multiplication and the relationship between multiplication and division**

💡 Cluster Standard: 3.OA.B.5

Standard	Standards for Mathematical Practice
Apply properties of operations as strategies to multiply and divide. Examples: If $6 × 4 = 24$ is known, then $4 × 6 = 24$ is also known. (Commutative property of multiplication.) $3 × 5 × 2$ can be found by $3 × 5 = 15$, then $15 × 2 = 30$, or by $5 × 2 = 10$, then $3 × 10 = 30$. (Associative property of multiplication.) Knowing that $8 × 5 = 40$ and $8 × 2 = 16$, one can find $8 × 7$ as $8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56$. (Distributive property.)	• **SMP 2:** Reason abstractly and quantitatively. • **SMP 8:** Look for and express regularity in repeated reasoning.

Clarification Statement	Students Who Demonstrate Understanding Can...
• Requires students to apply properties of operations as strategies to multiply and divide. • Requires students to explain and represent the commutative property (two factors can be multiplied in either order and still have the same product. • Students need to explain and represent the	• Explain the commutative property of multiplication where two factors can be multiplied in either order and have the same product. • Explain the associative property of multiplication states that the position of three or more factors grouped before multiplying does not affect the

associative property (the way in which three or more factors are grouped before multiplying does not affect the product).	product. ● Explain that the distributive property allows you to separate numbers into parts so that the numbers are easier to work with, and apply properties to use with basic facts or multiply with multiples.. ● Multiply and divide within 100 and explain how the properties of operations work. Apply properties of operations as strategies to multiply or divide. ● Utilize visuals that support their understanding of the application of properties as strategies to multiply and divide.
DOK	**Blooms**
2-3	Apply

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Understand properties of multiplication and the relationship between multiplication and division**

Cluster Standard: 3.OA.B.6

Standard	**Standards for Mathematical Practice**
Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.	● **SMP 5:** Use appropriate tools strategically. ● **SMP 6:** Attend to precision.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● Students need to explain and represent the distributive property (breaking numbers into parts so that the numbers are easier to work	● Describe how multiplication and division are related. ● Identify the unknown factor in the related

with) ● Students need to apply properties to recall basic facts or multiply with multiples of 10 ● Students need to use multiplication to find an unknown in a division equation, as well as use division to find an unknown in a multiplication equation. ● Students need to understand the relationship between multiplication and division and explain their processes of solving multiplication and division problems using an inverse operation.	multiplication problem. ● Identify the multiplication problem related to the division problem. ● Use multiplication and division to solve division problems. ● Recognize multiplication and division as related operations and explain how they are related. ● Solve an unknown-factor problem, by using division strategies and/or changing it to a multiplication problem. ● Use visuals such as an array with related multiplication problems to demonstrate their understanding of division as an unknown factor problem.
DOK	**Blooms**
1-2	Remember, Understand

Common Misconceptions

● Students may think that division is commutative. $5 \div 3 = 3 \div 5$	● Students may see multiplication and division as different and unrelated operations.

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Multiply and divide within 100**
	Cluster Standard: 3.OA.C.7	
	Standard	**Standards for Mathematical Practice**

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	● **SMP 5:** Use appropriate tools strategically. ● **SMP 6:** Attend to precision. ● **SMP 8:** Look for and express regularity in repeated reasoning.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● This standard requires students to be fluent with multiplication and division facts ● They need to use strategies, knowledge of relationships between multiplication and division, and the properties of operations, to recall basic facts quickly and accurately. ● It is not enough for students to recall facts from memory from timed tests alone, but from experiences with manipulatives, pictures, arrays, and word problems to internalize the basic facts.	● Solve problems using models and drawings as visuals as examples that represent multiplication and division facts. ● Relate models to written equations. ● Utilize strategies based on properties and patterns of multiplication to learn multiplication facts. ● Use multiplication facts in terms of missing factors to learn division facts.
DOK	**Blooms**
1-2	Remember, Understand

Common Misconceptions

● Students may struggle with fully comprehending the strategies that will help them achieve fluency. It is critical for each of these strategies to be taught explicitly. ● Students think a symbol (? or []) is always the place for the answer. This is especially true when the problem is written as 15 ÷ 3 =? or 15 = x 3.	● Students may think that 3 ÷ 15 = 5 and 15 ÷ 3 = 5 are the same equations.

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Solve problems involving the four operations, and identify and explain patterns in arithmetic.**

Cluster Standard: 3.OA.D.8

Standard	Standards for Mathematical Practice
Solve two-step word problems using the four operations. 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 1:** Make sense of problems and persevere in solving them. ● **SMP 3:** Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● This standard requires students to use their knowledge of the four operations to solve two-step word problems. They need to be able to determine the first and second step in a two-step word problem. ● They need to be able to represent a two-step word problem with models, pictures, and equations (two equations can be used in place of an equation with two operations). They also need to write an equation using a letter for the unknown.	● Solve two-step word problems using addition, subtraction, and multiplication. ● Determine the first step in a two-step word problem. Students then are able to determine the second step in a two-step word problem. ● Utilize models, drawings, and equations to represent the equation. ● Represent problems using equations with a symbol for the unknown number. ● Develop their skills and assess the answer that it makes sense and correlates with visual equations
DOK	**Blooms**
2-3	Apply, Analyze

Grade	CCSS Domain	CCSS Cluster
3	**Operations and Algebraic Thinking**	**Solve problems involving the four operations, and identify and explain patterns in arithmetic.**

Cluster Standard: 3.OA.D.9

Standard	Standards for Mathematical Practice

Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	● **SMP 5:** Use appropriate tools strategically. ● **SMP 7:** Look for and make use of structure.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● Students will determine if a solution to a two-step problem is reasonable using mental computation and estimation strategies including rounding. ● This standard requires students to examine patterns of multiplication. The ability to recognize and explain patterns in mathematics leads students to developing the ability to make generalizations, a foundational concept in algebraic thinking.	● Identify patterns in addition and multiplication charts. ● Explain patterns when adjusting addends (any number that is added together in an addition problem). ● Explain doubling a factor doubles the product. ● Explain that a factor can be decomposed and the partial products can be put back together. ● Interpret patterns of multiplication on a hundreds board and/or multiplication table. ● Use visuals that represent their thinking when identifying arithmetic patterns.
DOK	**Blooms**
1-2	Remember, Understand

Common Misconceptions

● Many students may think a pattern occurs if it only happens twice.

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.**

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- **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: **Represent and solve problems involving multiplication and division**
Suggested Student Discourse Questions	
- How are equal groups related to the quotient in a division equation? - Explain how your partner's strategy could be used to reach an acceptable solution.	- Which strategy to solve multiplication is more effective, tape diagrams or arrays? Explain - Where do you normally see arrays outside of school (in your home? In your community?)

Domain: **Operations and Algebraic Thinking**	Strand: **Understand properties of multiplication and the relationship between multiplication and division**
Suggested Student Discourse Questions	
- How are multiplication and division related to each other? - How does the distributive property help you solve complex multiplication equations? - Why are multiplication and division inverse operations?	- How do fact families help you solve equations? - How is the commutative property of addition related to the commutative property of multiplication? - How can arrays help with multiplication and division?

Domain: **Operations and Algebraic Thinking**	Strand: **Multiply and divide within 100.**
Suggested Student Discourse Questions	
- How can we use models to represent multiplication and division facts? - How does skip counting help you solve	- What strategies help you memorize multiplication and division facts? - Why is it important to memorize our math

multiplication? ● How can multiplication help you solve division?	facts?

Domain: **Operations and Algebraic Thinking**	Strand: **Solve problems involving the four operations. Identify and explain patterns in arithmetic.**
Suggested Student Discourse Questions	
● How do you know where to begin a word problem? ● How do you check what the problem is asking? ● What strategies do you use to break apart word problems?	● How can we use models, drawings, and equations to represent a problem? ● Is your answer reasonable and how can you determine that it is? ● What resources can you use to find patterns? (charts, tables, input and output diagrams, etc.)

ASSESSMENT GUIDE

- [Represent and solve problems involving multiplication and division](#)
- [Understand properties of multiplication and the relationship between multiplication and division](#)
- [Multiply and divide within 100](#)
- [Solve problems involving the four operations, and identify and explain patterns in arithmetic](#)

Grade	*CCSS Domain*	*CCSS Strand*
3	**Operations and Algebraic Thinking**	**Represent and solve problems involving multiplication and division**
	Sample Task #1 (Constructed Response)	
	These are the desks in Ms. Green's classroom.	
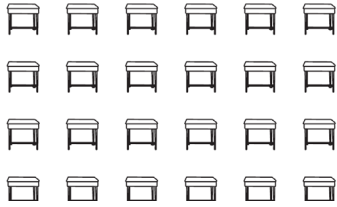
There is one desk for each student in Ms. Green's class.

a. Write a multiplication number sentence that can be used to find the number of students in the class.

Ms. Green wants to arrange the desks so that there are 3 equal rows.

b. How many desks will be in each row?

Ms. Green wants to arrange the desks so that there are 9 desks in each of the 3 rows.

c. How many more desks will Ms. Green need so that each row can have 9 desks? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

Tom writes this expression on his paper.

$$28 \div 4$$

Which situation could Tom's expression represent?

A. Tom has 28 books and gives 4 of them to his friend.
B. Tom gives 28 books to each of his 4 friends.
C. Tom has 28 books and buys 4 more books.
D. Tom puts 28 books equally on 4 shelves.

Grade	CCSS Domain	CCSS Strand
3	Operations and Algebraic Thinking	Understand properties of multiplication and the relationship between multiplication and division

Sample Task #1 (Constructed Response)

Charlie picks 20 apples. He divides them equally between 5 baskets. How many apples are in each basket? Explain your thinking.

	Sample Task #2 (Multiple Choice)

	Which expression can be used to find 6 x 8?
	    A. (3 x 2) + (4 x 2)
	    B. (6 x 4) + (6 x 2)
	    C. (6 x 4) + (6 x 4)
	    D. (8 x 6) + (8 x 8)

Grade	*CCSS Domain*	*CCSS Strand*
3	**Operations and Algebraic Thinking**	**Multiply and divide within 100**

Sample Task #1 (Constructed Response)
Ms. Lee puts all the students in her class into 6 groups. There are 4 students in each group. A. What is a multiplication sentence that can be used to determine the number of students in Ms. Lee's class? Show your work or explain how you know. B. Ms. Lee has 48 markers. She will give each group of students the same number of markers. What is a division sentence that can be used to determine the number of markers each group of students will get? Show your work or explain how you know.

Sample Task #2 (Multiple Choice)

Which two equations are true? Select the two correct answers.
    A. 6 x 8 = 42
    B. 7 x 9 = 63
    C. 8 x 3 = 28
    D. 18 ÷ 3 = 6
    E. 32 ÷ 4 = 9
    F. 54 ÷ 7 = 8

Grade	*CCSS Domain*	*CCSS Strand*

3	**Operations and Algebraic Thinking**	**Solve problems involving the four operations, and identify and explain patterns in arithmetic**

Sample Task #1 (Constructed Response)
Sandra keeps her sticker collection in 7 albums. Each album has 40 stickers in it. She starts a new album that has 9 stickers in it. How many total stickers does she have in her collection? Explain your thinking.
Sample Task #2 (Multiple Choice)
Emily's coach has 54 orange slices. The coach gives the same number of orange slices to each of the 9 players. Emily eats 3 of her orange slices. Which number sentence can be used to find the number of orange slices Emily has left? A. 54 - 3 - 9 = n B. 54 ÷ 3 ÷ 9 = n C. 54 - 9 ÷ 3 = n D. 54 ÷ 9 - 3 = n

MLSS AND CLR GUIDE

- Represent and solve problems involving multiplication and division
- Understand properties of multiplication and the relationship between multiplication and division
- Multiply and divide within 100
- Solve problems involving the four operations, and identify and explain patterns in arithmetic

CCSS Domain	*CCSS Cluster*
Operations and Algebraic Thinking	**Represent and solve problems involving multiplication and division**
Culturally and Linguistically Responsive Instruction	

Relevance to Families and Communities	During a unit focused on representing and solving problems involving multiplication and division, 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, when cooking a meal or dessert your child could figure out how much each family member should get which will be an introduction to fractions.

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Cross-Curricular Connections	● **Language Arts:** Essential vocabulary: multiplication, factor, array, equal groups, and repeated addition. Writing math word problems utilizing punctuation and spelling. Also include a five square graphic organizer that includes 1. The question, 2. Important information from the problem, 3. visual representation of the important information to solve the problem, 4. Solve the problem, 5. Students explain in writing what they did to solve the problem and why they used their method to solve the problem.

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 7 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 representing and solving problems involving multiplication and division the use of mathematical representations within the classroom is critical because it aids students in understanding the reasoning or the WHY behind the mathematics. Although procedural knowledge of multiplication and division is quicker, they are just steps without the understanding of the concepts and the procedure. Visual representations how students better visualize and quantify the numbers and concepts.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect to understanding of equal groups, skip counting by 2,	● Connect to division as an unknown-factor problem. **(3.OA.6)**	● Connect to understanding of multiplication and division, using

5, 10, 100's, work with arrays up to 5 rows and 5 columns. **(2.OA.4)**
- Connect to whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. **(2.OA.3)**
- Connect to counting within 1000; skip-counting by 5s, 10s, and 100s. **(2.NBT.2)**
- Connect to using addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends. **(2.OA.4)**

- Connect to multiply and divide within 100, using strategies such as the relationship between multiplication and division. **(3.OA.7)**
- Connect to apply properties of operations as strategies to multiply and divide. **(3.OA.5)**
- Connect the area to the operations of multiplication and addition. **(3.MD.7)**

various strategies to help with larger numbers. Learners will interpret a multiplication equation as a comparison. **(4.OA.1)**
- Connect to apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **(4.NF.4)**
- Connect to multiply or divide to solve word problems involving multiplicative comparison. **(4.OA.2)**
- Connect to apply the area and perimeter formulas for rectangles in real world and mathematical problems. **(4.MC.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 introduces new representations (e.g., number lines) when studying representing and solving problems involving 5 multiplication and division because understanding the visual representations will help students understand the concept. Understanding the visual representations will also help provide students with a strategy to record their understanding.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	2.OA.C.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends. This standard provides a foundation for work with representing and solving problems involving multiplication and division because it provides students with the foundation and understanding of the visual representation of arrays. It also provides the basis of the understanding of multiplication being repeated addition. 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*
- Multiplication is repeated addition - Division is repeated subtraction - Arrays can be used to model multiplication and division problems - The rows and columns of an array differ based on orientation of the array - Multiplication and division are inverse operations of each other and either can be used to "undo" the other operation	- Find products of whole numbers as the total number of objects in *n* groups of *n* objects each. - Solve multiplication problems by using equal groups, arrays, area, and/or measurement quantities. - Represent a real-world multiplication/division problem as a mathematical equation. - Represent a word problem using multiple methods, such as a picture, an equation with a symbol for the unknown number, etc.	- Build on students' experience with the following skills: - Rectangular arrays and repeated addition (2.OA.4) - Skip counting by 2s, 5s 10s, and 100s (2.NBT.2) - Partitioning shapes and groups of objects into equal shares (2.G.2, 2.G.3) - Solving one- and two step addition and subtraction word problems (2.OA.1) - Solving equations for the unknown - 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. This can include tools like: - Graphic organizers - Unifix cubes - Counters
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 solving problems involving multiplication and division by critiquing student approaches/solutions to make connections through a short mini-lesson because if students are able to critique student approaches and solutions they can then examine their own thinking and approach to determine if it is reasonable and accurate.
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 solving problems involving multiplication and division by offering opportunities to understand and explore different strategies because the more opportunities a student has to explore different strategies the more likely they will be able to find a strategy that makes sense to them and develop an understanding of a concept.

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 application of and development of abstract thinking skills when studying representing and solving problems involving multiplication and division because this will allow students to dive deeper into the concept and begin to explore the next steps of the standard. It also allows students to begin thinking about application of the concept.

CCSS Domain	CCSS Cluster
Operations and Algebraic Thinking	**Understand properties of multiplication and the relationship between multiplication and division**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on multiplication, 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, when making a quilt or blanket of a certain size, with a certain size of squares, how many squares would you need to create or make a quilt/blanket.
Cross-Curricular Connections	Science: Students could learn about Science by implementing information from plants, earth and space, cycles of life, animals, electricity and magnetism, and motion and sound to solve word problems.
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?*	● 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 understanding properties of multiplication and the relationship between multiplication and division the types of mathematical tasks are critical because if procedural knowledge is built without conceptual understanding students are only learning a process or steps, however they are not learning the WHY or the meaning of the math. Without conceptual knowledge students are basically doing what a calculator or computer could accomplish. Through building a conceptual understanding of the properties of multiplication and the relationship of multiplication and division students do not have to rely merely on a procedure to get an answer. Students can think through the math and use the procedure as a tool for calculating their answer. Students should also then be able to assess the reasonableness of their procedural answer when

		they have a conceptual understanding of the concept.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect to previous work understanding equal groups, skip counting by 2, 5, 10, 100's, work with arrays up to 5 rows and 5 columns. **(2.OA.3, 2.OA. 4 and 2.NBT.2)**	● Connections to multiplication and division exist across the standards in third grade. **(3.OA.1) (3.OA.2)(3.OA.3) (3.MD.7) (3.OA.5) (3.OA.6) (3.NBT.3) (3.OA.4) (3.OA.7) (3.OA.8) (3.OA.9)**	● Connect to 4th grade, where students use multiplication and division with larger numbers. **(4.NBT.5) (4.NBT.6)**

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 properties of multiplication and the relationship between multiplication and division because when students review their understanding of arrays and multiplication as repeated addition, then they can begin to connect the concepts. Also, when students review their understanding of addition and subtraction as inverse operations, they can apply this knowledge to multiplication and division being inverse operations.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.OA.4 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. This standard provides a foundation for work with understanding properties of multiplication and the relationship between multiplication and division because once students are able to understand and interpret products, they can begin to build the understanding of

the properties of multiplication as well as the relationship of multiplication and division. 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*
- Important multiplication properties. - Connections between multiplication models, written multiplication equations, and related division equations. - The solution to a division problem as a missing factor.	- Describe multiplication patterns and make generalizations. - Write equations that represent multiplication models. - Describe information in problem situations and relate that information to multiplication and division equations.	- Build on students' experience with the following skills: - Using repeated addition (2.OA.C.4) - Arranging objects in rectangular arrays (2.OA.C.4) - Write an equation to express the total as a sum of equal addends. (2.OA.C.4) - Skip counting by grouping objects (2.OA.C.3) - 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: - Graph and/or array paper - Counters - Number lines - Snap cubes - Number bond templates
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 properties of multiplication and the relationship between multiplication and division by revisiting student thinking through a short mini-lesson because through resisting their thinking students will need to think deeper about the ideals they have formed. Often through revisiting their thinking students will begin to find misconceptions or errors in their reasoning that they must re-examine in order to explain.
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 properties of multiplication and the relationship between multiplication and division by helping students move from specific answers to generalizations for certain types of problems because this allows students to develop patterns and understand what the product is and how it relates to division. Rather than just a memorization of the facts, students need an understanding of what the product represents in order to understand multiplication and its relationship to division. Through understanding the properties of multiplication students will better understand how it is related to division.
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 understanding properties of multiplication and the relationship between multiplication and division because it allows students to extend their understanding of multiplication and division and relate it to the relationship of other operations. It also helps students begin to explore the relationship of larger numbers.

CCSS Domain	CCSS Cluster
Operations and Algebraic Thinking	**Multiply and divide within 100.**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on multiplying and dividing within 100 fluently, 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 multiplying is used in the home and community for planning, shopping and cooking can a be a great way to connect schools tasks with home tasks.
Cross-Curricular Connections	Social Studies: Calculations related to populations, supply, goods, costs.
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?*	● 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 multiplying and dividing within 100 fluently, goal setting is critical because students will need short term goals for learning facts clusters from memory because there are too many facts which would be overwhelming for students to memorize without having them broken down into smaller achievable pieces. ● Tasks: The type of mathematical tasks and instruction students receive provides the foundation for students' mathematical learning and their mathematical identity. Tasks and instructions that provide greater access to mathematics and convey the creativity of mathematics by allowing for multiple solution strategies and development of the standards for mathematical practice lead to more students viewing themselves mathematically successful capable mathematicians than tasks and instruction

		which define success as memorizing and repeating a procedure demonstrated by the teacher. For example, when studying multiplying and dividing within 100 fluently the types of mathematical tasks are critical because students need to rely on a multitude of strategies to be able to understand and find products and quotients before they can commit the facts to memory.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect to previous work understanding equal groups, skip counting by 2, 5, 10, 100's, work with arrays up to 5 rows and 5 columns**. (2.OA.3, 2.OA. 4 and 2.NBT.2)**	● Connections to multiplication and division exist across the standards in third grade. **(3.OA.1) (3.OA.2)(3.OA.3) (3.MD.7) (3.OA.5) (3.OA.6) (3.NBT.3) (3.OA.4) (3.OA.7) (3.OA.8) (3.OA.9)**	● Connect to 4th grade, where students use multiplication and division with larger numbers. **(4.NBT.5) (4.NBT.6)**

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 multiplying and dividing within 100 fluently because students will need to use many different strategies and properties for understanding multiplication and division in order to find products & quotients for both smaller and larger numbers.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	3.OA.A.1 & 2.OA.A.2: These standards provide a foundation for work with representing and solving problems involving multiplication and division by interpreting products of whole numbers & interpreting whole-number quotients of whole numbers because

		students need to have a clear understanding of what multiplication & division means (using arrays, equal groups, area models, and repeated addition) before they would be able to find products, quotients, and become fluent . 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 relationship between multiplication and division. - How to use strategies for multiplication and division, including doubling, the Commutative Property, multiplying by nine as related to multiplication by ten, and thinking of division as an unknown factor problem. - What it means to compose and decompose numbers. - How to use known facts to help learn unknown facts.	- Use strategies to mentally/fluently multiply and divide numbers within 100. - Solve all products of two one-digit numbers effectively and efficiently.	- Build on students' experience with the following skills: - Thinking about multiplication as equal groups and numbers in groups (interpret 5 x 7 as 5 groups of 7 objects each). (3.OA.A.1) - Understanding that division is partitioning objects into equal shares (interpret 35 ÷ 5 as 5 equal shares of 7 objects each). (3.OA.A.2) - Applying the commutative property in addition. (1.OA.B.3) - Using number bonds/fact families from addition and subtraction to explain the inverse relationship between multiplication and division. - 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: - Graph and/or array paper

		○ Counters
		○ Number lines
		○ Snap cubes
		○ Number bond templates
		○ Distributive property templates

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 3.OA.B Understanding properties of multiplication and the relationship between multiplication and division by clarifying mathematical ideas and/or concepts through a short mini-lesson because applying properties like the commutative property, associative property, distributive property, and fact family knowledge of multiplication & division and their relationship is crucial for students to use to access multiple strategies for finding products & quotients before becoming fluent with facts.
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 3.OA.A Represent and solve problems involving multiplication and division by addressing conceptual understanding because students need to concretely understand the meaning of multiplication concretely using arrays, equal groups, area models, tape diagrams, and repeated addition before they can become proficient at fact knowledge and retrieval.

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 multiplying and dividing within 100 fluently because students could see the application of multiplying & dividing as well as be provided with a realistic opportunity to extend their ability to multiply by a double digit number based on prior strategies when

	learning to multiply (such as decomposing numbers).

CCSS Domain	CCSS Cluster
Operations and Algebraic Thinking	**Solve problems involving the four operations, and identify and explain patterns in arithmetic.**
Culturally and Linguistically Responsive Instruction	

Relevance to Families and Communities	During a unit focused on Solving problems involving the four operations, and identifying and explaining patterns in 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, for example, learning about the different examples of problem solving that occurs in the home and community can be a great connection to school. The problem solving can involve shopping, project costs, gardening resources, home repairs, building, and other home maintenance. Local jobs can also provide an opportunity to see the types of problem solving and pattern recognition that community workers are experiencing.
Cross-Curricular Connections	Language Arts: Students can write down step by step instruction guides on arithmetic patterns using the addition table or multiplication table and explain how to use them using the properties of operation. Students can publish their guides and keep them in a resource writing center.
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*	• Supporting Productive Struggle in Learning Mathematics: The standard for mathematical practice, makes sense of mathematics and persevere in solving them is the foundation for supporting productive struggle in the mathematics classroom. "Too frequently, historically marginalized students are overrepresented in classes that focus on memorizing and practicing procedures and rarely provide opportunities for students to think and figure things out for themselves. When students in these classes struggle, the teacher often tells them what to do without building their capacity for persistence." Teachers need to provide tasks that challenge students and maintain that challenge while encouraging them to persist. This encouragement or "warm-demander" requires a strong relationship with students and an understanding of the culture of the students. For example, when studying Solving

	culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?	problems involving the four operations, and identifying and explaining patterns in arithmetic. Supporting productive struggle is critical because students need to be able to access (low entrance) to the problem so they feel they are capable of solving the problem using their repertoire of skills whether it is using manipulatives, drawing pictures, or jumping to formulas. They need to receive support at whatever level they begin to continue through and have expectations that they can solve the problem with their current skills whether or not it is the most efficient. Their thinking and processes need to be validated for correctness and shared as are more efficient methods of peers. Perseverance and comprehension should be celebrated.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect to addition and subtraction problems, skip counting and adding equal groups. Learners used addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. **(2.MD.5) (2.OA.1) (2.NBT.5) (2.OA.3) (2.NBT.2)**	● Connect to the work throughout third grade with multiplication and division problems. **(3.OA.3) (3.OA.6) (3.MD.8) (3.OA.3) (3.OA.7) (3.MD.7) (3.OA.5) (3.OA.4) (3.OA.8) (3.OA.9)**	● Connect to future work with solving multi-step word problems using the four operations and generating patterns which follow a given rule. **(4.OA.3) (4.MD.2) (4.OA.5)**

Suggested Instructional Strategies

Pre-Teach

Level of Intensity	*Essential Question*	*Examples*
Targeted	*What pre-teaching will*	For example, some learners may benefit from targeted

	prepare students to productively struggle with the mathematics for this cluster within your HQIM?	pre-teaching that rehearses prior learning when studying Solving problems involving the four operations, and identifying and explaining patterns in arithmetic because students will need to apply the prior knowledge of addition and subtraction in conjunction with the newer knowledge of multiplying and dividing when solving multi-step problems involving a combination of the four operations and identifying patterns.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	2.OA.A.1: Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions: This standard provides a foundation for work with representing and solving problems involving addition and subtraction because using and understanding addition and subtraction to solve one & two steps problems is foundational to solving more complex problems involving any combination of the 4 operations. 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*
- Whether answers are reasonable by using number sense. - Connections between representations and equations that model a problem. - Why a number is rounded to the nearest 10 or 100. - The properties of operations.	- Use a variety of problem-solving strategies, including relating the problem in their own words, making models, and drawing pictures to represent their thinking. - Use letters to represent unknown quantities. - Recognize patterns in the addition and multiplication tables.	- Build on students' experience with the following skills: - Solving word problems involving addition and subtraction (2.MD.5) - Fluently add and subtract up to 20 (2.OA.1) - 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:
		    ○ Counters
		    ○ Unifix cubes
		    ○ Geometric pattern blocks
		    ○ Multiplication Charts

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 solving problems involving multiplication and division by revisiting student thinking through a short mini-lesson because understanding and representing multiplication and division appropriately to solve one & two steps problems is foundational to solving more complex problems dependent on a mix of the 4 operations.
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 understanding properties of multiplication and the relationship between multiplication and division by offering opportunities to understand and explore different strategies because students may need to see, draw, and use manipulatives to better clarify their understanding of properties of multiplication (distributive, commutative, associative) with arrays, equal groups and number lines to concretely solidify their understanding of the properties.
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 Solving problems involving the four operations, and identify and explain patterns in arithmetic because students can be provided

	the opportunity of solving more complex questions, problems, and patterns without scaffolding assistance.