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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

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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

- Understand ratio concepts and use ratio reasoning to solve problems
    - 6.RP.A.1
    - 6.RP.A.2
    - 6.RP.A.3

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Grade	CCSS Domain	CCSS Cluster
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems.**

🧠 Cluster Standard: 6.RP.A.1

Standard	Standards for Mathematical Practice
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	● **SMP 6**: Attend to precision. ● **SMP 8:** Look for and express regularity in repeated reasoning.

Clarification Statement	Students Who Demonstrate Understanding Can...
● Students are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	● Understand and explain that a ratio is a comparison of two quantities. ● Describe what a ratio illustrates using ratio language. ● Write a ratio relationship in the forms a:b, a to b, a/b. ● Translate a ratio relationship into words. ● Understand the differences between part: part and part: whole relationships.

DOK	Blooms
1-2	Understand, Apply

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Grade	CCSS Domain	CCSS Cluster
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems**

Cluster Standard: 6.RP.A.2

Standard	Standards for Mathematical Practice
Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.	**SMP 2:** Reason abstractly and quantitatively. **SMP 4:** Model with mathematics. **SMP 6:** Attend to precision. **SMP 7:** Look for and make use of structure.

Clarification Statement	Students Who Demonstrate Understanding Can...
Students are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	- Define a unit rate in relation to the concept of a ratio. - Represent units rates symbolically, in contexts, and through visuals. - Use precise language of unit rate to describe ratio relationships both orally and in writing.

DOK	Blooms
1-2	Understand, Apply

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Grade	CCSS Domain	CCSS Cluster
6	**RATIO AND PROPORTIONAL RELATIONSHIPS**	**Understand ratio concepts and use ratio reasoning to solve problems.**

🧠 Cluster Standard: 6.RP.A.3

Standard	Standards for Mathematical Practice
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations	**SMP 2:** Reason abstractly and quantitatively. **SMP 3:** Construct viable arguments and critique the reasoning of others. **SMP 4:** Model with mathematics.

Clarification Statement	Students Who Demonstrate Understanding Can...
Students are introduced to ratios, a relationship or comparison of two quantities or measures. They will represent ratios in various forms (a:b, a to b, a/b) and compare types of ratios. They will use reasoning about multiplication and division to solve ratio and rate problems about quantities. Students will learn how and where ratios and rates are used in the real world.	- Create and interpret tables of equivalent ratios - Plot values from a table on a coordinate plane - Examine tables in order to compare ratios. - Solve real-world unit rate problems - Calculate the percent of a quantity as a rate per 100. - Reason with ratios to convert, manipulate and transform units of measure

DOK	Blooms
1-2	Understand, Apply

Common Misconceptions

- When working to solve ratio problems, students may run into confusion with the order of quantities (i.e: the ratio of triangles to squares requires students to write the quantity of triangles first as the numbers are not interchangeable). Students may have similar difficulties when understanding when to create a part-to-part ratio vs. a part-to-whole ratio

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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: **Ratio and Proportional Relationships**	Strand: **Understand ratio concepts and use ratio reasoning to solve problems.**

Suggested Student Discourse Questions

- How is your strategy different from (student's name)? - Compare different ways of writing ratios and explain what it means in the context of the problem.	- Can you relate using proportions to something within your personal life? - When writing a ratio, is order important? Does the numerator always come first when writing a ratio? - How does ratio describe the relationship between two quantities?

ASSESSMENT GUIDE

- Understand ratio concepts and use ratio reasoning to solve problems

Grade	CCSS Domain	CCSS Strand
6	**Ratios and Proportional Relationships**	**Understand ratio concepts and use ratio reasoning to solve problems**

Sample Task #1 (Constructed Response)

Water is draining from a bucket with a hole in it. During a 10-minute period, the volume of water in the bucket decreases from 16 liters to 9 liters.

At what rate, in liters per minute, is the water draining from the bucket?

Sample Task #2 (Multiple Choice)

A recipe for banana bread uses 3 cups of flour for every 2 loaves of bread made. What is the ratio of cups of flour to 8 loaves of bread?

Ⓐ 5 : 8

Ⓑ 6 : 8

Ⓒ 12 : 8

Ⓓ 24 : 8

MLSS AND CLR GUIDE

- Understand ratio concepts and use ratio reasoning to solve problems

CCSS Domain	CCSS Cluster
Ratio and Proportional Relationships	**Understand ratio concepts and use ratio reasoning to solve problems**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on understanding ratio concepts and using ratio reasoning 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, learning about ratios used in the home and community can a be a great way to connect schools' tasks with home tasks.

Cross-Curricular Connections	Science:
	- Students can apply this to science by creating a ratio of the model of the solar system to the actual size of the solar system. In addition, students can use their knowledge of ratios to help them interpret the ratios of time, space, and energy to determine a ratio. MS-PS3-1 (Energy), MS-ESS1-3 (Earth's Place in the Universe)
	  - https://www.nextgenscience.org/pe/ms-ps3-1-energy
	  - https://www.nextgenscience.org/pe/ms-ess1-3-earthsplace-universe
	
	Social Studies:
	- Students can apply the idea of ratios to social studies. They can determine ratios of populations and other types of ratios that are associated with their study of social studies

| **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* | - Equity Based Practice (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 ways students talk about who is and isn't capable of mathematics, we can disrupt 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?*	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 understanding ratio concepts and using ratio reasoning to solve problems, facilitating meaningful mathematical discourse is critical because it improves students' reasoning abilities which builds their higher order thinking skills.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
● Connect students' previous understandings of conversion tables, graphing points, and how these ideas connect to the real world. These previous understandings will support students in their understanding of number relationships, specifically when comparing numbers. ● In Grade 4, learners were taught to multiply or divide to solve word problems involving multiplicative comparison. In Grade 5, learners had to interpret a	● Connect student understandings of ratio relationships and number relationship as they move to use variables to represent two quantities that change in relationship to one another in the 6.EE.9 CCSS.	● Connect student understanding of ratios and rate from Grade 6 to compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. ● These skills from this cluster are connected in Grade 7 when learners will recognize and represent proportional relationships between quantities. This includes student understanding of

fraction as division of the numerator by the denominator (a/b = a ÷ b) AND interpret multiplication as scaling or resizing. These skills will need to be explicitly reviewed to support student success with this domain		proportional relationships to solve multistep ratio and percent problems.

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 understanding ratio concepts and use reasoning to solve problems because students need to understand the difference between ratio and fractions which is a huge misconception.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	This standard provides a foundation for work in this cluster because it is interpreting a fraction of which students need a solid foundation as to not confuse fractions and ratios. 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 ratio is a comparison of two quantities.
● The differences between part: part and part: whole relationships.
	● Write ratio relationships in the forms a:b, a to b, a/b.
	● Solve ratio and rate reasoning problems with
		● Build on students' experience with the following skills:
		  ○ Understand conversion tables, graphing points
		  ○ Multiply or divide involving multiplicative comparison.
		  ○ interpret a fraction as division of the

● A unit rate compares two quantities with different units of measure.
● A percent of a quantity is a rate per 100
	tables, equivalent ratios, tape diagrams, double number line diagrams, or equations.
	● Solve and simplify unit rate problems.
	● Find the percent of a quantity and the whole given a part and a percent.
		numerator by the denominator
		  ○ interpret multiplication as scaling or resizing
		
		● 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:
		  ○ Use of various types of manipulatives
		    ■ Colored pencils
		    ■ Multiplication chart
		    ■ Manipulatives such as integer tiles

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 ratio concepts and use ratio reasoning to solve problems by clarifying mathematical ideas and/or concepts through a short mini lesson because students often confuse ratios and fractions. By clarifying the ratio concepts, misconceptions will be reduced, and it will allow students to explore ratios.
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 ratio concepts and use ratio reasoning to solve problems by addressing conceptual understanding because it allows students to attend to two quantities simultaneously. The students will be able to form a multiplicative comparison of two quantities and increase understanding of equivalent concepts.

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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 understanding ratio concepts and use ratio reasoning to solve problems because open ended tasks that link multiple disciplines will allow students to make connections and broaden their understanding of the concept and when and where to use it. Thus, increasing higher order thinking skills.