NEW MEXICO
Public Education Department

New Mexico Instructional Scope

3rd Grade Fractions Guide

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 **(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

- Develop understanding of fractions as numbers
  - 3.NF.A.1
  - 3.NF.A.2
  - 3.NF.A.3

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Grade	*CCSS Domain*	*CCSS Cluster*
3	**Number & Operations-Fractions**	**Develop understanding of fractions as numbers.**

Cluster Standard: 3.NF.A.1

Standard	**Standards for Mathematical Practice**
Understand a fraction $1/b$ 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 parts of size $1/b$.	• **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 use area and length models to compose and decompose fractions into equivalent fractions using related fractions: halves, fourths, eighths, thirds, and sixths. • Related fractions are fractions in which one denominator is a multiple of the others; thirds and sixths are related fractions, while fourths and sixths are not related fractions.	• Recognize a unit fraction such as ¼ as the quantity formed when the whole is portioned into 4 equal parts. • Identify a fraction such as 2/3 and explain that the quantity formed is 2 equal parts of the whole portioned into 3 equal parts (1/3 and 1/3 of the whole 3/3). • Express a fraction as the number of unit fractions • Use accumulated unit fractions to represent numbers equal to, less than, and greater than one (1/3 and 1/3 is 2/3; 1/3,⅓, 1/3, and 1/3 is 4/3). • Explain and represent a unit fraction. • Explain and represent a non-unit fraction. • Identify the numerator and denominator and understand the meaning of each in a fraction. • Explain how fraction representations are related (*1/b* relates to *a/b*). • Identify a unit fraction and build other fractions from the unit fraction.
DOK	**Blooms**
1	Remember, Understand

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Grade	*CCSS Domain*	*CCSS Cluster*
3	**Fractions**	**Develop understanding of fractions as numbers**

Cluster Standard: 3.NF.A.2

Standard	Standards for Mathematical Practice
3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. • 3.NF.A.2.A: Represent a fraction *1/b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size *1/b* and that the endpoint of the part based at 0 locates the number *1/b* on the number line. • 3.NF.A.2.B: Represent a fraction *a/b* on a number line diagram by marking off a length *1/b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line.	• **SMP 2**: Reason abstractly and quantitatively. • **SMP 4**: Model with mathematics. • **SMP 5**: Use appropriate tools strategically.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
• Students should be able to explain that fractions with the same numerator and denominator equal one whole. • Renaming fractions with the same numerator and denominator as one whole without a model is not sufficient for this standard.	• Understand fractions as numbers. • Interpret fractions with denominators of 2,3,4,6, and 8 using area and length models. • Using an area model, explain that the numerator of a fraction represents the number of equal parts of the unit fraction. • Using a number line, explain that the numerator of a fraction represents the number of lengths of the unit fraction from 0. • Recognize a unit fraction such as ¼ as the quantity formed when the whole is partitioned into 4 equal parts. • Express a fraction as the number of unit fractions. • Define the interval from 0 to 1 on a number line

	as the whole. ● Divide a whole on a number line into equal parts. ● Recognize that the equal parts between 0 and 1 have a fractional representation. ● Represent each equal part on a number line with a fraction. ● Explain that the endpoint of each equal part represents the total number of equal parts.
DOK	**Blooms**
1-2	Understand, Apply

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Grade	*CCSS Domain*	*CCSS Cluster*
3	**Fractions**	**Develop understanding of fractions as numbers**

Cluster Standard: 3.NF.A.3

Standard	**Standards for Mathematical Practice**
3.NF.A.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size. ● 3.NF.A.3.A: Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. ● 3.NF.A.3.B: Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4 , 4/6 = 2/3 . Explain why the fractions are equivalent, e.g., by using a visual fraction model. ● 3.NF.A.3.C: Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1 ; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. ● 3.NF.A.3.D: Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	● **SMP 2**: Reason abstractly and quantitatively. ● **SMP 3:** Construct viable arguments and critique the reasoning of others.
Clarification Statement	**Students Who Demonstrate Understanding Can...**
● The standard expects students to express whole numbers as fractions. This work is limited to whole numbers less than 4. ● Expressing whole numbers as fractions lays the groundwork for seeing a fraction as a division	● Compare fractions by reasoning about their size to determine equivalence. ● Use number lines, size, visual fraction models, etc. to find equivalent fractions. ● Recognize whole numbers written in fractional

problem. e.g. The fraction 4/2 represents 4 pieces that are a half each and that equals 2 wholes. ● This standard is the building block for later work in Grade 5 where students divide a set of objects into a specific number of groups.	parts on a number line. ● Recognize the difference in a whole number and a fraction. ● Explain how a fraction is equivalent to a whole number. ● Explain what the numerator in a fraction represents and identify its location. ● Explain what the denominator in a fraction represents and identify its location. ● Explain that a fraction with the same numerator and denominator equals one whole. ● Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. ● Recognize whether two or more fractions refer to the same whole. ● Determine if comparisons of fractions can be made (if they refer to the same whole). ● Compare two fractions with the same numerator by reasoning about their size. ● Compare two fractions with the same denominator by reasoning about their size. ● Compose and decompose fractions into equivalent fractions using fractions: halves, fourths and eighths; thirds and sixths ● Record the results of comparisons using symbols <, =, or >. ● Justify conclusions about the equivalence of fractions.
DOK	**Blooms**
2-3	Apply, Analyze

Common Misconceptions

● Students may not use benchmark numbers like 0, 1/2, and 1 to compare fractions because they have restricted their understanding of fractions to part-whole situations and do not think of the fractions as numbers. ● Students may overgeneralize and think that “all 1/4 s (for example) are equal”.	● Students may not understand that the size of the whole determines the size of the fractional part. ● Students may struggle with the idea that the smaller the denominator, the smaller the piece or part of the set, or the larger the denominator, the larger the piece or part of the set.

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. This process 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: **Develop understanding of fractions as numbers**

Suggested Student Discourse Questions

• What are the different ways we can represent fractions? • What do numerators and denominators represent? • What strategies can you use to find equivalent fractions and compare fractions?	• Why is a fraction a number? • When do we use fractions in everyday life?

ASSESSMENT GUIDE

- Develop understanding of fractions as numbers

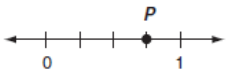
Grade	*CCSS Domain*	*CCSS Strand*
3	**Fractions**	**Develop understanding of fractions as numbers**

Sample Task #1 (Constructed Response)

Chloe's dad partitions his garden into 4 equal-sized sections to plant tomatoes, squash, peppers, and cucumbers. What fraction of the garden is available for growing tomatoes?

Sample Task #2 (Multiple Choice)

. A number line is shown.



Which fraction represents point *P* on the number line?

Ⓐ $\frac{1}{4}$

Ⓑ $\frac{2}{3}$

Ⓒ $\frac{3}{4}$

Ⓓ $\frac{4}{5}$

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MLSS AND CLR GUIDE

- Develop understanding of fractions as numbers

CCSS Domain	*CCSS Cluster*
Fractions	**Develop understanding of fractions as numbers**

Culturally and Linguistically Responsive Instruction

Relevance to Families and Communities	During a unit focused on understanding fractions as 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: increasing or decreasing ingredients in a recipe; using statistics from current events, relevant to a family or community, to determine their impact (converting a whole number statistic into a fraction to show its impact as part of a greater whole population); using a given amount of time, determining how it is used, and comparing the portions of that time for time management goals, using a given amount of money, determining how it is used, and comparing the portions of that money to set a budget; dividing a plot of land into equal portions to plan and plant a garden, etc.	
Cross-Curricular Connections	Social Studies: Based on current events and topics, create a survey, collect data, and represent results in each category as fractions of the whole survey population. Music: Reading the value of musical notes 1/4, 1/2, 3/4, 1 and the relation of note count to measure.	
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*	• 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

	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?*	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 understanding fractions as numbers supporting productive struggle is critical because building and internalizing fractions as parts of a whole that can be represented by numbers is foundational to all future comprehension of fraction math problems. It is through productive struggle that students develop their own understanding of math concepts in a mental context that they own, that has meaning to them, and that they can easily access and manipulate for future procedural tasks and problem solving.

Planning for Multi-Layered System of Supports

Vertical Alignment

Previous Learning	*Current Learning*	*Future Learning*
• Connect to partition shapes, measure length and solve problems using addition and subtraction**.** • Connect to equally partitioned circles and rectangles into halves, thirds and fourths, and recognize that equal shares of identical wholes need not have the same shape. **(2.G.3)** • Connect to measure the length of an object twice, using length units of different lengths for the two measurements; described how the two measurements relate to the size of the unit chosen **(2.MD.2).** • Connect to use addition and subtraction within 100 to solve	• Connect the partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole **(3.G.2).** • Connect to generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show 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 of fraction equivalence, build fractions from unit fractions and understand and compare decimal fractions. Learners will understand a fraction a/b with a>1 as a sum of fractions 1/b **(4.NF.3).** • Connect to make a line plot to display a data set of measurements in fractions of a unit (½, ¼, ⅛). Solve problems involving addition and subtraction of fractions by using information presented in line plots **(4.MD.4).** • Connect to apply and extend previous understanding of multiplication to multiply a

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)** ● Connect to represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0,1, 2..., and represent whole-number sums and differences within 100 on a number line diagram **(2.MD.6).** ● Connect to generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units **(2.MD.9).**		fraction by a whole number **(4.NF.4).** ● Connect to explain why a fraction a/b is equivalent to a fraction (n × a)/(n × 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. **(4.NF.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 uses images/resources (especially those being used the first time) when studying to develop understanding of fractions as numbers because while using different representations, such as pictures, students are introduced to appropriate labels to communicate the meaning of their representation.
Intensive	*What critical understandings will prepare students to access the mathematics for this cluster?*	1.G.A.3: This standard provides a foundation for work with develop understanding of fractions as numbers because student need the foundational understanding of equal share partitioning, how to accurately describe the shares, and the understanding that decomposing into more equal shares creates smaller shares in order to

		make the connection between concrete (e.g., pictures) and abstract (e.g., 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***

• Given the same size whole, the larger the denominator the smaller the size of the pieces because there are more pieces in the whole.
• It is possible for fractional parts of a whole to be the same size, but not the same shape.
• Points on the number line represent the distance from 0 to that specific point and are made up of the number of unit fraction intervals.
• The meaning of fraction equivalence, including that whole numbers are equivalent to fractions.
	• Make models of fractions (with denominators 2, 3, 4, 6, and 8) using fraction strips.
	• Represent unit fractions on a number line and construct a number line based on a unit fraction, including fractions greater than 1.
	• Compare fractions using symbols (<, >, =).
	• Use various representations, including area models, fraction strips, and the number line to find equivalent fractions that name the same quantity or point.
		• Build on students' experience with the following skills:
		  ○ Thinking about a fraction as a whole partitioned into equal parts
		  ○ Use number lines to represent whole numbers (2.MD.B.6)
		  ○ Recognizing and applying inequality symbols to compare whole 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:
		  ○ Number lines
		  ○ Fraction tiles
		  ○ Snap cubes
		  ○ Real world objects (eg pizza, chocolate bars, etc.)
		  ○ Reference material for equivalent fractions (eg equivalent fraction strips)
		  ○ Cooking tools and measuring cups

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 developing understanding of fractions as numbers by revisiting student thinking through a short mini-lesson because when students can explain their thought process, they also understand the possibility of different interpretations and therefore the necessity for precision in their work.
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 developing understanding of fractions as numbers by confronting student misconceptions because it takes time and multiple passes to develop understanding, so students need regular opportunities to think about, talk through, and refine ideas.
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 develop understanding of fractions as numbers because in order to develop and solidify ideas, students need to be able to connect what they are learning to multiple disciplines and real-world connections through the productive struggle of open-ended tasks.