NEW MEXICO
Public Education Department

4.NF: NUMBER & OPERATIONS-FRACTIONS

Cluster Statement: C: Understand decimal notation for fractions, and compare decimal fractions.

Major Cluster (Students should spend the large majority of their time (65-85%) on the major work of the grade/course. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.)

Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
4.NF.C.5 **Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.** ***For example, express*** $\frac{3}{10}$ ***as*** $\frac{30}{100}$***, and add*** $\frac{3}{10}+\frac{4}{100}=\frac{34}{100}$.	SMP 1: Students can make sense of problems and persevere in solving them by first expressing two fractions with the same denominator and then adding them. SMP 8: Students look for and express regularity in repeated reasoning by generating fractions that can be added using concepts of base 10 and then adding them.	• Explain how a fraction with a denominator of 10 is equal to a fraction with a denominator of 100. • Convert a fraction with a denominator of 10 to an equivalent fraction with a denominator of 100. • Add two fractions with denominators of 10 or 100. **Depth Of Knowledge:** 1,2 **Bloom's Taxonomy:** Apply
Standard Text **4.NF.C.6** **Use decimal notation for fractions with denominators 10 or 100.** ***For example, rewrite 0.62 as*** $\frac{62}{100}$***; describe a length as 0.62 meters; locate 0.62 on a number line diagram.***	**Standard for Mathematical Practices** SMP 7: Students can look for and make use of structure by writing fractions as decimals using the previous knowledge of place value structure.	**Students who demonstrate understanding can:** • Write fractions with denominators of 10 or 100 as decimals. • Write decimals as fractions with denominators of 10 or 100. • Write a money amount given in words as a whole dollar and fraction amount. • Write a measurement using decimals. • Write two fractions and two decimals that represent the same amount. • Develop strategies to write decimals as equivalent fractions. **Depth Of Knowledge:** 1,2

		Bloom's Taxonomy: Understand, Apply
Standard Text ***4.NF.C.7*** ***Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.***	**Standard for Mathematical Practices** SMP3: Students can construct viable arguments and critique the reasoning of others by comparing the size of two decimals and justify the reason for the larger decimal.	**Students who demonstrate understanding can:** • Reason about the size of two decimals to the hundredths place. • Use symbols (>, <, or =) when comparing decimals. **Depth Of Knowledge:** 1,2 **Bloom's Taxonomy:** Understand/ Apply
Previous Learning Connections • Connect to exploring fractions on a number line in third grade. • Connect to explaining equivalence and generating equivalent fractions (3.NF.3) • Connect to understanding that that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (2.NBT.1) • Connect to comparing two fractions with the same numerator or the same denominator by reasoning about their size(3.NF.3d)	**Current Learning Connections** • Connect to adding and subtracting fractions with like denominators (4.NF.3) • Connect to solving measurement word problems involving decimals (4.MD.2) • Connect to reading, writing, and comparing multi-digit whole numbers (4.NBT.2) • Connect to comparing fractions with different numerators and denominators(4.NF.2)	**Future Learning Connections** • Connect to recognizing that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and1/10 of what it represents in the place to its left (5.NBT.1)

Clarification Statement:
4.NF.C5: This standard explores the relationship between **fractions** and **decimals**. Students use previous learning of **equivalent fractions** to apply to **denominators** of 10 and 100. This includes finding equivalence, **adding** and **subtracting tenths** and **hundredths** using models and explanations.

4.NF.C6: Decimals are introduced for the first time. Students should have ample opportunities to explore and reason about the idea that a number can be represented as both a **fraction** and a **decimal**. Decimals and fractions both represent parts of a whole

4.NF.C7: This standard requires students to **compare** decimals to the hundredths when those two decimals refer to the same whole. Students compare using the symbols <, >, = and **justify** their response by creating a visual model. When comparing decimals, students should use models (such as hundredths grids) and number lines. When locating decimals on a number line the smaller numbers are farther to the left and the greater number is farther to the right. Students need to understand that some decimals are equivalent. Sharing examples with models to show that .4 = .40 will help students see the equivalency. Decimal numbers are rational numbers and

so we can use them to indicate quantities that are less than one or between any two whole numbers. In between any two decimal numbers, there is always another decimal number.

Common Misconceptions

- Some students might think the longer the decimal, the greater the value, so 2.146 would be greater than 2.4. The shorter the decimal, the greater the value, so 6.31 would be greater than 6.*482*.

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

Pre-Teach

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

- For example, some learners may benefit from targeted pre-teaching that rehearses prior learning when studying understanding decimal notation for fractions, and comparing decimal fractions because teachers will need to review equivalent fractions and comparing fractions from 3rd and 4th grade standards. Students can also use base ten blocks to represent decimals. Previous work with base ten blocks will depend on student experience.

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

- 3.NF.A.3: This standard provides a foundation for work with understanding decimal notation for fractions, and comparing decimal fractions because this third grade standard is the first traditional work with equivalent fractions for students. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Core Instruction

Access

Interest: *How will the learning for students provide multiple options for recruiting student interest?*

- For example, learners engaging with understanding decimal notation for fractions, and compare decimal fractions benefit when learning experiences include ways to recruit interest such as providing contextualized examples to their lives because this is a difficult concept, but when relating it to their lives through money will help students connect to the concept .

Build

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

- For example, learners engaging with understanding decimal notation for fractions, and compare decimal fractions benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as generating relevant examples with students that connect to their cultural background and interests because students need to understand the idea of decimals including the size. This can be done through using examples such as money, where pennies are hundredths and dimes are tenths.

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

- For example, learners engaging with understanding decimal notation for fractions, and compare decimal fractions benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as allowing for flexibility and easy access to multiple representations of notation because representation of decimals can be helpful for students to understand. This can be done through money or visuals models such as hundred grids. Multiple representations help students discover a strategy that helps them understand the mathematics of decimals.

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

- For example, learners engaging with understanding decimal notation for fractions, and compare decimal fractions benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as using physical manipulatives because like fractions, students need to have a conceptual understanding of decimals. Using physical manipulatives (such as base ten blocks) helps students visualize decimals. Moving to a visual model (such as hundred grid) will help with building student understanding.

Internalize
Self-Regulation: *How will the design of the learning strategically support students to effectively cope and engage with the environment?*

- For example, learners engaging with understanding decimal notation for fractions, and compare decimal fractions benefit when learning experiences set personal goals that increase ownership of learning goals and support healthy responses and interactions (e.g., learning from mistakes), such as addressing subject specific phobias and judgments of "natural" aptitude (e.g., "how can I improve on the areas I am struggling in?" rather than "I am not good at math") because expressing fractions as decimals and/or decimals as fractions and comparing them can pose a challenge for many students. These skills are essential. Stopping and reflecting on where the mistakes lie and working to understand them and correct them will strengthen their understanding.

Re-teach

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

- For example, students may benefit from re-engaging with content during a unit on understanding decimal notation for fractions, and comparing decimal fractions by clarifying mathematical ideas and/or concepts through a short mini-lesson because students will need mathematical ideas clarified. Students tend to generalize numbers. For example, they might think 1/100 is greater than 1/10 because 100 is greater than 10. Revisiting these ideas and making clarification of these concepts will help students.

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

- For example, some students may benefit from intensive extra time during and after a unit understanding decimal notation for fractions, and comparing decimal fractions by addressing conceptual understanding because students who struggle with fractions need support with concrete models. Using base ten blocks, place value

charts, or hundreds blocks that students can color in to show the fractions help students build visual pictures and strengthen conceptual understanding.

Extension

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

For example, some learners may benefit from an extension such as the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying understanding decimal notation for fractions, and comparing decimal fractions because students who have extensive practice with fractional decimals can quickly move from fraction to decimal form (and vice versa). This can extend to adding and subtracting fractional decimals within word or real world problems. This type of work would not extend students into different standards but build fluency for later work with decimals and fractions.

Culturally and Linguistically Responsive Instruction:

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

Equity Based Practice (Eliciting and Using Evidence of Student Thinking): Eliciting and using student thinking can promote a classroom culture in which mistakes or errors are viewed as opportunities for learning. When student thinking is at the center of classroom activity, "it is more likely that students who have felt evaluated or judged in their past mathematical experiences will make meaningful contributions to the classroom over time." For example, when studying understanding decimal notations for fractions and compare decimal fractions eliciting and using student thinking is critical because <when working with expressing fractions with a denominator of 10 as a fraction with a denominator of 100 in order to add two fractions (or the opposite) turning decimals into fractions (or the opposite), and comparing decimals all require a solid understanding of part to whole relationships, renaming using equivalents based on place value, and overall place value understanding. When students habitually explain their thinking, they find successes and mistakes. These mistakes become learning opportunities as opposed to failures.

Standards Aligned Instructionally Embedded Formative Assessment Resources:

Source: Cognia Testlet for Grade 4 Numbers and Operations-Fractions

Standard: 4.NF.C.5

Learning Targets: I can add fractions with denominators 10 and 100. I can rewrite a fraction as an equivalent decimal.

Task:

1. Look at this addition problem.

$$\frac{5}{10} + \frac{6}{100}$$

a. Write the sum of the two fractions.

b. Rewrite the sum from part (a) as a decimal.

This type of assessment question requires students to add fractions with denominators of 10 and 100 finding equivalent denominator of 100. It also ask students to convert answer of fraction into decimal notation. This task will give the teacher different indicators for misconceptions that students have involving fraction, decimals, and the equivalence between the 10^{ths} and 100ths.

Relevance to families and communities:	**Cross-Curricular Connections:**
During a unit focused on understanding decimal notations for fractions and compare decimal fractions, consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students, for example, students learn about the ways decimals are used in the real world, both at home and in the community. Students connect to the Imperial and Metric systems of measurement to make global connections. Students could examine ways decimals are used in various occupations which could connect to families and/or the world in general.	STEM Connection: Students can create a measuring cup for a science experiment using the metric system. As they do, have students pay attention to precision and remind them the parts must be equal. The act of partitioning reinforces an understanding of the relationship between the decimal fraction and the whole.