NEW MEXICO
Public Education Department

4.NF: NUMBER & OPERATIONS-FRACTIONS

Cluster Statement: A: Extend understanding of fraction equivalence and ordering.

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.A.1 **Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $(\frac{n \times a)}{(n \times b)}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.**	SMP 4: Students can model mathematics by creating visual models of equivalent fractions to build understanding. SMP 8: Students can look for and express regularity in repeated reasoning by discussing patterns as they find equivalent fractions.	• Use models to show the value of a fraction • Explain how a fraction model represents the quantity of a fraction • Use models to demonstrate that two fractions are equivalent • Represent equivalent fractions using models. • Multiply and divide to find equivalent fractions. **Depth Of Knowledge:** 1,2 **Bloom's Taxonomy:** Understand
Standard Text	**Standard for Mathematical Practices**	**Students who demonstrate understanding can:**
4.NF.A.2 **Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions,**	SMP 3/4: Students can construct and justify viable arguments comparing the size of two fractions using benchmark fractions, number lines, and visual fraction models.	• Explain how to convert two fractions to have common denominators. • Explain how to convert two fractions to have common numerators. • Convert fractions to have common denominators. • Convert fractions to have common numerators. • Compare two fractions with different numerators and denominators. • Use symbols (<, >, =) to compare two fractions

e.g., by using a visual fraction model.		**Depth Of Knowledge:** 1,2 **Bloom's Taxonomy:** Apply
Previous Learning Connections • Connect to partitioning shapes into halves, thirds, and fourths in 2nd grade. • Connect to finding equivalent fractions and using symbols to compare fractions in 3rd grade.	**Current Learning Connections** • Connect to learning about multiplicative comparison (4.OA. A2) • Connect to learning about using an understanding of relative size to convert between units of measurement (4.MD. A1)	**Future Learning Connections** • Connect to adding and subtracting fractions and mixed numbers with unlike denominators (5.NF. A1) • Connect to solving fraction addition and subtraction word problems (5.NF. A2)

Clarification Statement:
Equivalent fractions are fractions that represent equal value. They are numerals that name the same fractional number. Equivalent fractions have **whole**s that are the same size, students need to understand this concept. Upon generating a rule for finding equivalent fractions, students should understand how that connects to the **identity property of multiplication or division** (5/5 = 1, therefore any fraction multiplied by 5/5 would be the **equivalent** or equal). Students should generate and justify why their fractions are equivalent. This lends to the generation of the **rule** (or procedure) for equivalent fractions. Upon discovering the rule, students should be able to explain why the rule works.

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

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 extend understanding of fraction equivalence and ordering because students have worked with simple equivalent fractions and comparing fractions with denominators of 2, 3, 4, 6, and 8.

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 extend understanding of fraction equivalence and ordering because in this third grade standard students begin to work with simple equivalent fractions and comparing using similar numerator and denominator. This is foundational work with equivalent and ordering fractions. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Core Instruction

Access
Physical Action: *How will the learning for students provide a variety of methods for navigation to support access?*

- For example, learners engaging with extending understanding of fraction equivalence and ordering benefit when learning experiences ensure information is accessible to learners through a variety of methods for navigation, such as varying methods for response and navigation by providing alternatives to pencil and paper while creating fractions and fraction equivalencies and range of motor action with instructional materials, physical manipulatives, and technologies; physically interacting with materials by hand or keyboard because constructing fractions and their equivalents using more than paper and pencil will help students develop a deeper understanding.

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

- For example, learners engaging with extending understanding of fraction equivalence and ordering 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 fraction equivalents and ordering fractions can be applied to many different real-world situations that students can directly connect to their own lives thus making the work more meaningful.

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 extending understanding of fraction equivalence and ordering benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as making explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams because connecting the numeric fraction (a/b) to various models such as pictures, diagrams, 3D representations, etc.

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 extending understanding of fraction equivalence and ordering benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as using physical manipulatives because students reach a deeper understanding of ordering fractions and fraction equivalents by creating hands-on representations.

Internalize
Comprehension: *How will the learning for students support transforming accessible information into usable knowledge, knowledge that is accessible for future learning and decision-making?*

- For example, learners engaging with extending understanding of fraction equivalence and ordering benefit when learning experiences attend to students by intentionally building connections to prior understandings and experiences; relating important

information to the learning goals; providing a process for meaning making of new learning; and, applying learning to new contexts such as "chunking" information into smaller elements because focusing on working on finding equivalent fraction with regards to one unit fraction at a time or beginning with ordering two fractions and building to ordering more than two fractions builds capacity thereby increasing math confidence.

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 extend understanding of fraction equivalence and ordering by revisiting student thinking through a short mini-lesson because teachers can assess what students already know and build on their thinking. Teachers can also see misconceptions in student thinking and correct them during a mini-lesson.

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 extend understanding of fraction equivalence and ordering by addressing conceptual understanding because students need understanding in fractions. Students who struggle with fractions tend to look at numbers within fractions and try to generalize them. Students with these types of misconceptions will need concrete work with manipulatives to build conceptual understanding. They will need to physically see that ½ bar is bigger than ¼ bar, even though in whole numbers a 4 is greater than 2.

Extension

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

For example, some learners may benefit from an extension such as the opportunity to understand concepts more quickly and explore them in greater depth than other students when studying extend understanding of fraction equivalence and ordering because students need extensive work in equivalent fractions to become fluent with simple fractions (2/4 is equal to ½, etc). This work will help them become flexible with equivalent fractions (reducing) and build foundational understanding for 5th grade work.

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 (Using and Connecting Mathematical Representations): The standard for mathematical practice, use appropriate tools strategically, provides a strong foundation to validate and bridge for students. Mathematical representations are mathematical tools. The linguistic and cultural experiences of students provide different and varied types of representations for solving mathematical problems. By explicitly encouraging students to use multiple mathematical representations students can draw on their "mathematical, social, and

cultural competence". By valuing these representations and discussing them we can connect student representations to the representations of school mathematics and build a bridge for students to position them as competent and capable mathematicians. For example, when studying extending understanding of fraction equivalence and ordering fractions the use of mathematical representations within the classroom is critical because students need to work with fractions presentations in many ways, many times in order to develop a strong sense of benchmark fraction knowledge in order to help when rationalizing about fraction equivalents and ordering fractions.

Standards Aligned Instructionally Embedded Formative Assessment Resources:

*Source***:** http://tasks.illustrativemathematics.org/content-standards/4/NF/A/1/tasks/881

Standard: 4.NF.1

Task: Fractions and Rectangles

Fractions and Rectangles

a.

What fraction of the rectangle below is shaded?

b. Laura says that $\frac{1}{4}$ of the rectangle is shaded. Do you think she is correct? Explain why or why not by using the picture.

This type of assessment question requires students to determine fraction, recognize equivalent fraction, and explain their thinking. This standard asks students to reason why fractions are equivalent using visual representations (SMP 4 & SMP 5). This task will help teacher see where students are having trouble with fractions and equivalence, which will help with reteaching or planning for future lessons. This task will also help determine misconceptions that can be corrected during reteach.

Relevance to families and communities:	Cross-Curricular Connections:
During a unit focused on extending understanding of fraction equivalence and ordering fractions consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students, students can look for ways they use fractions at home and share their findings with the classroom community.	Science: Students may track precipitation levels in fractional amounts using a graduated cylinder or rain gage.