Unpacked South Dakota State Mathematics Standards

Purpose: *In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*

Domain: Number and Operations—Fractions	**Grade Level: 3**

3.NF.A Cluster: Develop understanding of Fractions as numbers

Students understand that unit fractions are numbers (numerator is 1 & denominators can be 2, 3, 4, 6, 8) and their placement on a number line as parts of a whole and will relate whole numbers and unit fractions to other equivalent fractions with different denominators.

****This is a MAJOR cluster.** *Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.*

3.NF.1. Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts (example: 1 part out of 4 equal parts is the same as 1/4); understand a fraction a/b as the quantity formed by a parts of size 1/b. (example:3/4 is the same as 3 one-fourths (1/4, 1/4, 1/4).

3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.

- **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.
- **b.** Represent a fraction a/b on a number line diagram by marking off a lengths 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.

3.NF.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
Note - Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.

- **a.** Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
- **b.** Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4 (2 one-fourth parts. ¼, ¼), 4/6 = ⅔ (2 one-third parts. ⅓, ⅓). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- **c.** Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
- **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 >.

Aspects of Rigor for Student Understanding: (Conceptual, Procedural, and/or Application)

Conceptual Understanding	***Procedural Fluency***	***Application***
Learners demonstrate their knowledge of numerators and denominators of unit fractions using concrete models and correct fractional wording. **(3.NF.1)** Learners will use models of fractions and label them. **(3.NF.1)**		

Learners will use both a number line and a number line diagram to represent a unit fraction of a whole. **(3.NF.2)** Learners will partition both a number line and a number line diagram to represent a given unit fraction of a whole. **(3.NF.2)** Learners understand a number line has intervals which are unit fractions. **(3.NF.2)** Learners recognize the point on a number line represents the distance from 0 to a specific endpoint. **(3.NF2)**	*This is the first time 3rd graders have seen fractions on a number line.* Learners represent unit fractions on a number line. **(3.NF.2)** Learners represent unit fractions on a blank number line. **(3.NF.2)** Learners construct a number line based on a unit fraction. **(3.NF.2**)	
Learners understand the meaning of equivalence. **(3.NF.3)** Learners will generate equivalent fractions using various models. **(3.NF.3)** Learners understand whole numbers are equivalent to fractions (examples: 1=4/4, 2=2/1 or 8/4). **(3.NF.3)** Learners will compare same denominator fractions with different numerators in relevance to size. **(3.NF.3)** Learner will compare same numerator fractions with different denominators in relevance to size. **(3.NF.3)**	Learners will compare fractions using symbols (<,>,=). **(3.NF.3)**	

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
    - Students make sense between the numerator and denominator.
2. **Reason abstractly and quantitatively.**
    - Students extend their knowledge beyond unit fractions using visual representations to explain their thinking.
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
    - Students use the appropriate tools to make connections to unit fractions.
5. **Use appropriate tools strategically.**
    - Unit models
    - Area models to fraction strip models to number line models.
6. **Attend to precision.**
    - Students begin to understand equivalency.
7. **Look for and make use of structure.**
    - Students use repeated reasoning to compose other fractions from unit fractions, including fractions equal to or greater than 1.
    - Students build understanding of the meaning of common fractions extended to fractions greater than 1.
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions		
Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
In 2nd grade, learners partition shapes, measure length and solve problems using addition and subtraction. Learners equally partitioned circles and rectangles into halves, thirds and fourths, and recognized that equal shares of identical wholes need not have the same shape. **(2.G.3)** Learners measured 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)**. 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)** Learners 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**). Learners 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)**	In 3rd grade, learners develop understanding fractions are numbers. ** Standards have been listed in this column to show progression of learning and how instruction correlates (a mutual relationship or connection, in which one thing affects or depends on another.) with the focus standard which is boldfaced.* **Learners 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. (3.NF.1)** **Learners understand a fraction as a number on the number line; represent fractions on a number line diagram.(3.NF.2).** Learners partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole **(3.G.2).** Learners 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)** **Learners explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. (3.NF.3abcd)**	In 4th grade, learners extend their 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)**. Learners will 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)**. Learners will apply and extend previous understanding of multiplication to multiply a fraction by a whole number **(4.NF.4)**. Learners will 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)**

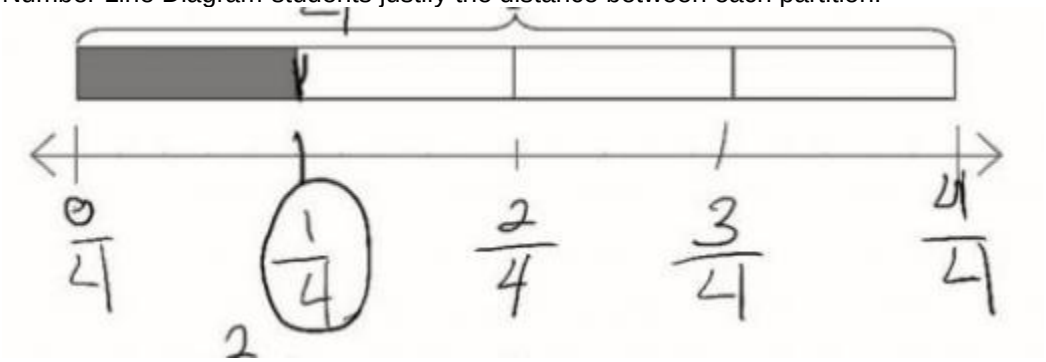
Vocabulary *(Key Terms Used by Teachers and Students in this Cluster):*

- Unit fraction
- Equivalent fraction
- Numerator
- Denominator
- Whole
- Number line
- Partitioned, parts (pieces)

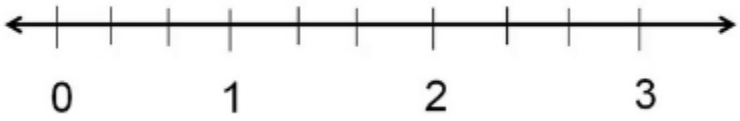
Relevance, Explanations, and Examples:

- It is very important to use the correct language when using the following symbols <,>,=.
  - a<b a is less than b
  - a>b a is greater than b
  - a=b a is the same as b

Number Line Diagram-students justify the distance between each partition.



Number Line-students place fractional parts on a number line



When the numerator and denominator are the same, the value of the number is one whole.
$\frac{6}{6} = 1$

When the denominator is 1, the fraction represents wholes. The number of wholes is the same as the numerator.
$\frac{8}{1} = 8$

When the numerator is a multiple of the denominator, the number of wholes is their quotient.
$\frac{12}{3} = 4$

Achievement Level Descriptors

Cluster: **Develop understanding of Fractions as numbers.**

Concepts and Procedures	**Level 1** Students should be able to identify a fraction as a number and identify a fraction on a number line when the increments are equal to the denominator.
	Level 2 Students should be able to understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; recognize simple equivalent fractions; express whole numbers as fractions; and recognize that comparisons are valid only when the two fractions refer to the same whole.
	Level 3 Students should be able to understand a fraction a/b as the quantity formed by a parts of size 1/b; represent a fraction on a number line with partitioning; generate simple equivalent fractions and recognize when they are

	equal to whole numbers; and compare two fractions with the same numerator or the same denominator by reasoning about their size.
	Level 4 Students should be able to explain why two fractions are equivalent and approximate the location of a fraction on a number line with no partitioning.