Cluster 7: Understanding Fractions as Parts of a Whole

Duration: 4-5 weeks

Content Standards:

This list includes standards that will be addressed in this cluster, but not necessarily mastered, since all standards are benchmarks for the end of the year. Please note the recommendations in the Important Considerations section of this cluster for more information.

NC.3.NF.1

Interpret unit fractions with denominators of 2, 3, 4, 6, and 8 as quantities formed when a whole is partitioned into equal parts;

- Explain that a unit fraction is one of those parts.
- Represent and identify unit fractions using area and length models.

NC.3.NF.2

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.

NC.3.NF.3

Represent equivalent fractions with area and length models by:

- Composing and decomposing fractions into equivalent fractions using related fractions: halves, fourths and eighths; thirds and sixths.
- Explaining that a fraction with the same numerator and denominator equals one whole.
- Expressing whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

NC.3.NF.4

Compare two fractions with the same numerator or the same denominator by reasoning about their size, using area and length models, and using the >, <, and = symbols. Recognize that comparisons are valid only when the two fractions refer to the same whole with denominators: halves, fourths and eighths; thirds and sixths.

Mathematical Practices:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

What is the mathematics?

Throughout this unit, students develop an understanding that fractions are numbers and represent fractions using area and linear models and with symbolic notation. This work builds on the idea of partitioning (dividing) a whole into equal parts from first and second grades. First and second graders used the concept of partitioning and words for fractions (one half, two-thirds, four-fourths), and in third grade students represent fractional parts of equal parts of area, name each of the parts as a unit fraction, and learn that one fourth of the whole is one of four equal parts.

The study of fractions in third grade begins with learning that unit fractions (fractions with the numerator 1) are formed by partitioning a whole into equal parts. It is important for students to see the

unit fraction as the basic building blocks for all fractions. Students begin to understand that just as all whole numbers are made of a specific number of 1s, all fractions are made of a specific number of unit fractions.

The placement of fractions after geometry allows students to connect decomposing of rectangles and triangles to partitioning of shapes. Additionally, the measurement of length in the cluster that follows (Cluster 8) allows students to continue their exploration of linear models for fractions, in particular.

Students will:

- Understand the meaning of fractions and the ways fractions are represented. To anchor their understanding of fractions in a real-world context, third graders work with fractions with the following denominators: halves, fourths and eighths; thirds and sixths. Third graders use a variety of contexts (rectangles representing cakes, pattern blocks, and number lines) to represent equal parts of a whole.
- Understand that the unit fraction is the basic building blocks for all fractions. Just as all whole numbers are made of a specific number of 1s, all fractions are made of a specific number of unit fractions.
- Use area models to represent fractions as parts of a whole.
- Understand that the size of a fractional part is relative to the size of the whole.
- Use number lines to extend their understanding of the number system and focus on fractions as numbers. In the next cluster, students can use their understanding of fractions on a number line to represent measurements and solve problems, with inches, feet and yards, including fractions.
- Use fractions to represent numbers equal to, less than, and greater than one.
- Compare two fractions with the same numerator or same denominator by reasoning about their size, using area and length models, and using the >, <, and = symbols.
- Recognize that comparisons are valid only when the two fractions refer to the same whole.
- Share their thinking by communicating their reasoning and sharing their solutions.

Important Considerations

- This work connects to the prior cluster because partitioning of area models is related to partitioning of geometric shapes.
- Third grade is the first time students will see fractions written in numerical or symbolic form. Previous work in 2nd grade describe the shares using the words halves, thirds, half of, a third of, fourths, fourth of, quarter of.