Gateway Regional School District

Atlas

Unit Plan

3.5 Fractions as Numbers

Chester / Littleville Elementary / Grade 3 / Mathematics

Week 20 - Week 24 | 4 Curriculum Developers | Last Updated: Mar 19, 2024 by LeBlanc, Deanna

Style Guide

What is the purpose of the unit? What are the major take-aways?

Standards

MA: Mathematics (2017)
MA: Grade 3
Operations & Algebraic Thinking

3.OA Understand properties of multiplication and the relationship between multiplication and division.

- 5. Apply properties of operations to multiply. Show Details

3.OA Multiply and divide within 100.

- 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two single-digit numbers and the related division facts. For example, the product 4 x 7 = 28 has related division facts 28 ÷ 7 = 4 and 28 ÷ 4 = 7.

Number & Operations—Fractions

3.NF Develop understanding of fractions as numbers for fractions with denominators 2, 3, 4, 6, and 8. Show Details

- 2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.
- 3a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
- 3b. 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.
- 3c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Show Details
- 1. Understand a fraction 1/b as the quantity formed by 1 part when a whole (a single unit) is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
- 2a. Represent a unit 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 fraction, 1/b, is located 1/b of a whole unit from 0 on the number line.
- 2b. 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.

Geometry

3.G Reason with shapes and their attributes.

- 2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. Show Details

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Enduring Understandings

Essential Questions

1. Fractions are numbers that represent parts of a whole. When we talk about fractions, we are describing how many pieces we have in comparison to a complete item or set that is divided into equal parts.

2. A fraction consists of a numerator (the top number, indicating the parts we have) and a denominator (the bottom number, indicating how many equal parts the whole is divided into). When we say 1/b, we mean that we have one part of something that has been divided into b equal parts.

3. Fractions can be thought of as division problems. For instance, the fraction 1/4 can be understood as 1 ÷ 4. This conceptualization helps us to see fractions as numbers and relate them to the operations of multiplication and division that we use with whole numbers.

4. Just like whole numbers, fractions can be located on a number line. This helps us visualize their value and compare them. When we represent fractions on a number line, we are demonstrating that fractions have an order and can be sequenced just like whole numbers.

5. The understanding of fractions as numbers extends to the understanding of multiplication and division. Knowing that multiplication is repeated addition can help students realize that multiplying a fraction by a whole number results in adding that fraction together multiple times.

6. Mastery of the relationship between multiplication and division facts is crucial. By knowing the multiplication tables, students can easily find the related division facts. For example, if a student knows that 8 × 5 = 40, they should also know that 40 ÷ 5 = 8 and 40 ÷ 8 = 5. This relationship is important when working with fractions since fractions can also be interpreted as division statements.

7. Each point on the number line that corresponds to a fraction is a specific distance from zero, just like whole numbers. This distance is determined by the size of the fraction (1/b) so that each fraction is actually a measure of a certain length from zero on the number line.

1. How can we understand fractions as numbers?
- What does it mean when we say a fraction is a number on the number line?
- How does understanding fractions on a number line help us visualize their size and relationships?

2. How can fractions be represented on a number line?
- How do you show a fraction like 1/4 on a number line?
- Why do we divide a number line into equal parts to represent fractions?
- What changes on the number line when we look at different fractions?

3. What is the relationship between multiplication and fractions?
- How can multiplication help us understand and find equivalent fractions?
- In what ways can we use multiplication to compare fractions?

4. How do fractions relate to division?
- Can you use division to explain the concept of a fraction?
- How can understanding division help us work with fractions?

5. How does understanding multiplication and division help us work with fractions?
- How do multiplication and division connect to the idea of breaking a whole into equal parts (fractions)?
- Why is it important to know multiplication and division facts when working with fractions?

6. What are unit fractions and why are they important?
- What is a unit fraction and how can we find it on a number line?
- How do unit fractions help us understand other, more complex fractions?

7. How can we use fractions to describe parts of a whole in real-life situations?
- Can you give examples of when you might use fractions in your everyday life?
- How do fractions help us measure and compare quantities that are not whole numbers?

Content

In this unit, students make sense of fractions as numbers, using various diagrams to represent and reason about fractions, compare their size, and relate them to whole numbers. The denominators of the fractions explored here are limited to 2, 3, 4, 6, and 8.
In grade 2, students partitioned circles and rectangles into equal parts and used the language "halves," "thirds," and "fourths." Students begin this unit in a similar way, by reasoning about the size of shaded parts in shapes. Next, they create fraction strips by folding strips of paper into equal parts and later represent the strips as tape diagrams.

Skills

Section A Goals

- Understand that fractions are built from unit fractions such that a fraction a/b is the quantity formed by a parts of size 1/b1.
- Understand that unit fractions are formed by partitioning shapes into equal parts.

Section B Goals

- Understand a fraction as a number and represent fractions on the number line.

Section C Goals

- Explain equivalence of fractions in special cases and express whole numbers as fractions and fractions as whole numbers.

Section D Goals

Using fraction strips and tape diagrams to represent fractions prepare students to think about fractions more abstractly: as lengths and locations on the number line. This work builds on students' prior experience with representing whole numbers on the number line.
In each representation, students take care to identify 1 whole. This helps them reason about the size of the parts and whether a fraction is less or greater than 1. (Fractions greater than 1 are not treated as special cases.)

Students then use these representations to learn about equivalent fractions and to compare fractions.
They see that fractions are equivalent if they are the same size or at the same location on the number line, and that some fractions are the same size as whole numbers.

Later in the unit, students compare fractions with the same denominator and those with the same numerator. They recognize that as the numerator gets larger, more parts are being counted, and as the denominator gets larger, the size of each part in a whole gets smaller.
Throughout the unit
The progression of warm-ups in the unit mirrors the development of fraction concepts in the unit. Students work with unit fractions, then learn that non-unit fractions are made of unit fractions. Students learn how to locate fractions on a number line. They identify and generate equivalent fractions before comparing fractions with the same numerator or denominator. Later warm-ups of the unit prepare students for work with fractional lengths in the next unit.

- Compare two fractions with the same numerator or denominator, record the results with the symbols >, =, or <, and justify the conclusions.

How will you gauge student learning?

Assessments

3.5 End-of-Unit Assessment | Summative | Written Test

Grade3-5-End-of-Unit-Assessment-assessment.pdf

7 State Standards Assessed

How will students learn?

Learning Activities

Section A:
In this section, students use shaded diagrams and fraction strips to learn about fractions, building on their prior knowledge of halves, thirds, and fourths.
Students partition rectangles into 6 or 8 equal parts and describe each part as "a sixth" or "an eighth" and write the notation 16/ or 1/8.

They learn that the notation 1/b refers to a unit fraction, or the size of each part if the whole is partitioned into parts. Working with fraction strips allows students to see non-unit fractions as being composed of unit fractions, so a parts of unit fractions of size 1/b gives a non-unit fraction a/b.
For example, putting together 3 pieces of fourths or 3 parts of the unit fraction 1/4 gives 3/4.

As students develop their understanding, they make connections between the meaning, language, and notation of fractions—between what fractions represent and how they are expressed in words and in numbers. (The terminology “numerator” and “denominator” are not introduced until later so students can focus on meaning making.)

Section B:
In this section, students reason about fractions on the number line. This work relies on two prior experiences: locating whole numbers on the number line, and partitioning a whole into equal parts.
Students have previously learned that numbers can be represented as distances from 0 on the number line. Here, students learn that the same is true about fractions. Students begin by partitioning the interval between 0 and 1 into equal parts, just as they had done with fraction strips and tape diagrams.

They then mark the first tick mark with a unit fraction 1/b and locate non-unit fractions by counting lengths the size of 1/b. They reason that a tick mark that is a intervals away represents a fraction a/b. The terms “numerator” and “denominator” are introduced here.
Students also notice that certain fractions are in the same location as whole numbers on the number line. For example, 4/4 and 8/4 are at the same location as 1 and 2, respectively. This observation helps students understand that whole numbers can be represented as fractions.

Section C:
In this section, students learn that equivalent fractions are fractions that are the same size.
They first identify equivalent fractions by noticing parts that are of equal length on fraction strips and tape diagrams.
For example, the shaded third in the first diagram is the same size as the two shaded sixths in the second diagram, so 1/3 and 2/6are equivalent.

Students see that they can show equivalence by decomposing each fractional part into smaller parts, or by grouping fractional parts to make larger parts.
Suppose we want to show that the shaded parts of this diagram represent both 6/8 and 3/4.

If we group 2 eighths together, we have 4 equal groups, each being a fourth. We can see that the 6 shaded eighths and 3 shaded fourths are the same size.

Later, students learn that equivalent fractions are the same distance away from 0 and are therefore located at the same point on the number line. They write equations to express equivalence, including for fractions that are equivalent to whole numbers.

Section D:
In this section, students compare fractions using any representation or reasoning strategies that make sense to them. They learn that comparisons are only valid if the fractions being compared refer to the same whole.
Students begin by deciding if two fractions are equivalent. They use diagrams, number lines, and the meaning of fractions to support their reasoning.
Next, students compare fractions with the same denominator. They see that these fractions are composed of parts of the same size, so to compare them involves looking at the numerators to see which fraction has more parts.
For example, there are 4 sixths in 4/6 and 5 sixths in 5/6, so 4/6 is less than 5/6. On the number line, 4/6 would to the left of 5/6, closer to 0.

4/6<5/6

In contrast, fractions with the same numerator have the same number of parts, so to compare them involves looking at the denominators to see which fraction is made up of larger parts.
For instance, 5 sixths is greater than 5 eighths because a sixth is larger than an eighth.

56>5/8

The work here reinforces the idea that as the denominator increases, the size of each part gets smaller.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections