Eureka Grade 4 - Unit 4

Desired Results

Foundations for Fraction Operations

Enduring Understandings

Topic A: Fraction Decomposition and Equivalence

Topic B: Equivalent Fractions

Topic C: Compare Fractions

Topic D: Add and Subtract Fractions

Topic E: Add and Subtract Mixed Numbers

Topic F: Repeated Addition of Fractions as Multiplication

Essential Questions

Lesson 1: Decompose whole numbers into a sum of unit fractions.

Lesson 2: Decompose fractions into a sum of unit fractions.

Lesson 3: Decompose fractions into a sum of fractions.

Lesson 4: Represent fractions by using various fraction models.

Lesson 5: Rename fractions greater than 1 as mixed numbers.

Lesson 6: Rename mixed numbers as fractions greater than 1.

Lesson 7: Rename fractions as a sum of equivalent smaller unit fractions.

Lesson 8: Generate equivalent fractions with smaller units for unit fractions.

Lesson 9: Generate equivalent fractions with smaller units for non-unit fractions.

Lesson 10: Generate equivalent fractions with larger units.

Lesson 11: Represent equivalent fractions by using tape diagrams, number lines, and multiplication or division.

Lesson 12: Generate equivalent fractions for fractions greater than 1 and generate equivalent mixed numbers.

Lesson 13: Compare fractions by using the benchmarks 0, ½, and 1.

Lesson 14: Compare fractions with related denominators.

Lesson 15: Compare fractions with related numerators.

Lesson 16: Generate a common numerator or denominator to compare fractions.

	Lesson 17: Apply fraction comparison strategies to compare fractions greater than 1. Lesson 18: Estimate sums and differences of fractions by using benchmarks. Lesson 19: Add and subtract fractions with like units. Lesson 20: Subtract a fraction from a whole number. Lesson 21: Solve addition and subtraction word problems and estimate the reasonableness of the answers. Lesson 22: Add two fractions with related units. Lesson 23: Add a fraction to a mixed number. Lesson 24: Add a mixed number to a mixed number. Lesson 25: Subtract a fraction from a mixed number, part 1. Lesson 26: Subtract a fraction from a mixed number, part 2. Lesson 27: Subtract a mixed number from a mixed number. Lesson 28: Represent and solve word problems with mixed numbers by using drawings and equations. Lesson 29: Solve problems by using data from a line plot. Lesson 30: Represent data on a line plot. Lesson 31: Decompose non-unit fractions into a product of a whole number and a unit fraction. Lesson 32: Multiply a fraction by a whole number by using the associative property. Lesson 33: Solve word problems involving multiplication of a fraction by a whole number. Lesson 34: Multiply a mixed number by a whole number by using the distributive property.

Guiding Questions

Lesson 1: What models can we use to decompose a whole number? How are the models similar and different?

Lesson 2: Where do you see unit fractions in the representations of fractions?

Lesson 3: Why can you decompose fractions in different ways?

Lesson 4: How can we use an area model to represent fractions? What helps you determine which model to use to represent a fraction?

Lesson 5: What models can we use to rename fractions greater than 1 as mixed numbers? How can we use models to efficiently rename fractions greater than 1 as mixed numbers?

Lesson 6: What models can we use to rename mixed numbers as fractions greater than 1? How can we use models to efficiently rename mixed numbers as fractions greater than 1?

Lesson 7: How can we make equivalent fractions? What models can we use to decompose fractional units and identify equivalent fractions? How are the models similar and different?

Lesson 8: What happens to the total number of parts and number of selected parts when we decompose an area model to find equivalent fractions? How can we use multiplication to express equivalent fractions represented in the area model?

Lesson 9: Is multiplication useful when finding equivalent fractions? How?

Lesson 10: What happens to the total number of parts and the number of shaded parts when we compose to make larger fractional units? How can we use factors when generating equivalent fractions with larger units?

Lesson 11: How can we tell whether units were composed or decomposed to represent an equivalent fraction? How can we use a tape diagram and number line to represent equivalent fractions?

Lesson 12: How can we use number lines and multiplication to represent equivalent fractions for fractions greater than 1? How can we use what we know about mixed numbers to find equivalent mixed numbers?

Lesson 13: Why is creating a common denominator helpful when comparing fractions?

Lesson 14: Why is creating a common denominator helpful when comparing fractions?

Lesson 15: Why is creating a common numerator helpful when comparing fractions?

Lesson 16: How do the denominator and numerator in the numbers we are given help us determine a strategy we can use to compare? When is renaming both fractions before comparing an efficient strategy?

Lesson 17: Can we use strategies used to compare fractions less than 1 to compare fractions greater than 1? How?

Lesson 18: How can we use benchmarks to estimate sums and differences of fractions? Why do we sometimes have different estimates of a sum or a difference?

Lesson 19: How is adding and subtracting fractions with like units similar to adding and subtracting whole numbers? How can we use a number line to represent adding and subtracting fractions with like units?

Lesson 20: How can we subtract a fraction from a whole number? When does renaming or decomposing whole numbers help you subtract fractions with like units ?

Lesson 21: How can we use estimates to decide whether our answer is reasonable?

Lesson 22: Why do we need to make like units to add fractions? How can we use what we know about equivalent fractions to add fractions with related units?

Lesson 23: How can we use what we know about adding like units to add a mixed number and a fraction? Are strategies such as making the next whole number useful when adding a mixed number and a fraction? Why?

Lesson 24: How can we use what we know about adding like units to add mixed numbers? Why can we use similar methods to add a mixed number and a fraction and to add mixed numbers?

Lesson 25: How can we use benchmarks to help us subtract? How do you decide what method to use when subtracting a fraction from a mixed number?

Lesson 26: Why is it helpful to decompose a part or the total when subtracting a fraction from a mixed number?

Lesson 27: How can you use what you know about subtracting a fraction from a mixed number to subtract mixed numbers? How do you decide which method to use when subtracting mixed numbers?

Lesson 28: How can pictorial models help us make sense of a problem? How can familiar methods help us solve problems?

Lesson 29: How can we use what we know about mixed numbers to solve problems by using data on a line plot? Why is it important to be able to interpret data on a line plot?

Lesson 30: Why is a line plot a useful way to represent measurement data? How do we determine when to use the data in a table or on a line plot to efficiently answer questions about measurement data?

Lesson 31: How does decomposing a fraction into the product of a whole number and a unit fraction help you better understand the fraction?

Lesson 32: What happens to the fractional units when we multiply a fraction by a whole number? Why? How do you use the associative property when multiplying a fraction by a whole number?

Lesson 33: Can using tape diagrams help you find a solution path? How? How do you decide when to rename a product that is a fraction greater than 1 as a mixed number?

Lesson 34: How do you use the distributive property when multiplying a mixed number by a whole number?

Knowledge

Topic A

In topic A, students decompose whole numbers and fractions into sums of fractions. They also develop an understanding that a mixed number is the sum of a whole number and a fraction less than 1, which helps them as they rename fractions greater than 1 and rename mixed numbers.

Topic B

In topic B, students use models, multiplication, and division to generate equivalent fractions and equivalent mixed numbers.

Topic C

In topic C, students compare fractions with unlike numerators and denominators by using models and benchmarks and by renaming fractions to create common denominators or common numerators.

Topic D

In topic D, students add and subtract fractions less than or equal to 1 and subtract a fraction from a whole number.

Topic E

In topic E, students use familiar whole-number strategies to add and subtract mixed numbers.

Topic F

In topic F, students multiply fractions and mixed numbers by a whole number.

Skills

3.Mod5.AD2 Represent a fraction a/b as the quantity formed by a parts of size 1/b.

3.Mod5.AD4 Represent a fraction a/b on a number line by partitioning the number line into intervals of length 1/b, starting from 0.

3.Mod5.AD5 Generate equivalent fractions by using a visual fraction model.

3.Mod5.AD7 Compare two fractions with the same numerator or the same denominator and justify the conclusion by using a visual fraction model.

3.Mod5.AD8 Explain that comparisons of two fractions are valid only when the fractions refer to the same whole.

4.Mod4.AD1 Model and explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$.

4.Mod4.AD2 Generate equivalent fractions and their representations.

4.Mod4.AD3 Compare two fractions with different numerators and different denominators and justify the conclusions.

4.Mod4.AD4 Decompose fractions into a sum of fractions with the same denominator in more than one way.

4.Mod4.AD5 Add mixed numbers with like denominators.

4.Mod4.AD6 Subtract mixed numbers with like denominators.

4.Mod4.AD7 Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

4.Mod4.AD8 Represent fractions as multiples of unit fractions with the same denominator.

4.Mod4.AD9 Multiply a fraction by a whole number.

4.Mod4.AD10 Solve word problems involving multiplication of a fraction by a whole number.

4.Mod4.AD11 Create a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8) and solve

	problems involving addition and subtraction of fractions by using the line plot.

Standards

MA.NY-4.NF.1 Explain why a fraction *a*/*b* is equivalent to a fraction (*a* × *n*)/(*b* × *n*) 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. e.g., 1/4 = (1 × 2)/(4 × 2) = (1 × 3)/(4 × 3) [Graphic cannot be reproduced.]

MA.NY-4.NF.2 Compare two fractions with different numerators and different denominators. 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. Note: Without specifying the whole, the shaded area could represent the fraction 3/2 (if one square is the whole) or 3/4 (if the entire rectangle is the whole). [Graphic cannot be reproduced.]

MA.NY-3.NF.1 Understand a unit fraction, 1/*b*, is 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*.

MA.NY-4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

MA.NY-4.MD.2.a Solve problems involving fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.

MA.NY-4.MD.2.b Represent measurement quantities using diagrams that feature a measurement scale, such as number lines.

MA.NY-4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. e.g., Given measurement data on a line plot, find and interpret the difference in length between the longest and shortest specimens in an insect collection.

MA.NY-4.NF.3.a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

MA.NY-4.NF.3.b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions. e.g., Justify decompositions by using a visual fraction model such as, but not limited to: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8

MA.NY-4.NF.3.c Add and subtract mixed numbers with like denominators. e.g., replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction

MA.NY-3.NF.3.a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

MA.NY-3.NF.3.b Recognize and generate equivalent fractions. Explain why the fractions are equivalent. e.g., using a visual fraction model

MA.NY-4.NF.3.d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. e.g., using visual fraction models and equations to represent the problem

MA.NY-3.NF.3.c Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. e.g., Express 3 in the form 3 = 3/1, recognize that 6/3 = 2, and locate 4/4 and 1 at the same point of a number line.

MA.NY-4.NF.4.a Understand a fraction *a*/*b* as a multiple of 1/*b*. e.g., Use a visual fraction model to represent 5/4 as the product 5 ×

1/4, recording the conclusion with the equation 5/4 = 5 × 1/4.

MA.NY-3.NF.3.d Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons rely on the two fractions referring to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions. Note: Without specifying the whole, the shaded area could represent the fraction 3/2 (if one square is the whole) or 3/4 (if the entire rectangle is the whole). [Graphic cannot be reproduced.]

MA.NY-4.NF.4.b Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a whole number by a fraction. e.g., use a visual fraction model to express 3 × 2/5 as 6 × 1/5, recognizing this product as 6/5, e.g., [graphic cannot be reproduced]. In general, *n* × (*a*/*b*) = (*n* × *a*)/*b*.

MA.NY-4.NF.4.c Solve word problems involving multiplication of a whole number by a fraction. e.g., If each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

MA.NY-3.MD.7.a Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

Assessment Evidence

ADs and their proficiency indicators support teachers with interpreting student work on informal classroom observations, data from other lesson-embedded formative assessment,

- Exit Tickets,
- Topic Quizzes, and
- Module Assessments

Learning Plan

Learning Activities

This section includes activities, experiences, or mini-lessons that students may engage in. Some of them may scaffold learning and others may foster interdisciplinary connections. These should be tied to the standards. Opportunities for intervention or differentiation should be notated here.

Resources

Materials, both printed and electronic from Eureka Math 2 New York