

| Course Title: Mathematics | Full Year | Required |
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| <p>Course Description:</p> <p>The mathematical work for grade 4 is partitioned into 9 units:</p> <ol style="list-style-type: none"> 1. Factors and Multiples 2. Fraction Equivalence and Comparison 3. Extending Operations to Fractions 4. From Hundredths to Hundred-thousands 5. Multiplicative Comparison and Measurement 6. Multiplying and Dividing Multi-digit Numbers 7. Angles and Angle Measurement 8. Properties of Two-dimensional Shapes 9. Putting it All Together | | |
| <p>Additional Course Information:</p> <p>The big ideas in Grade 4 include:</p> <ul style="list-style-type: none"> ● generalizing place value understanding for multi-digit whole numbers. ● using place value understanding and properties of operations to perform multi-digit arithmetic and solve problems. ● developing understanding and fluency with multi-digit multiplication ● developing understanding of dividing to find quotients involving multi-digit dividends ● building fractions from unit fractions by applying and extending previous understandings of operations with whole numbers. ● developing an understanding of fraction equivalence and ordering, as well as addition and subtraction of fractions with like denominators ● multiplication of fractions by whole numbers ● understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry. ● Required fluency: Add and subtract within 1,000,000 (4.NBT.B.4) | <p>Core Resources:</p> <p>Illustrative Mathematics</p> <p>Instructional Routines and Math Language Routines</p> <p>Grade 4 Glossary Grade 4 Unit 3 Glossary</p> <p>Required Materials</p> <p>IM en Español Grade 4 en Español</p> <p>Developing a Mathematical Community</p> | <p>Are there any attachments <u>at the course level</u> that teachers will need?</p> <p>Grade 4 Scope and Sequence</p> <p>Pacing Guide and Dependency Diagrams K-5</p> |

Unit 3: Extending Operations to Fractions

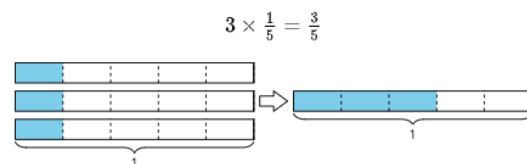
Duration: 20-22 days

Unit Overview - FOCUS:

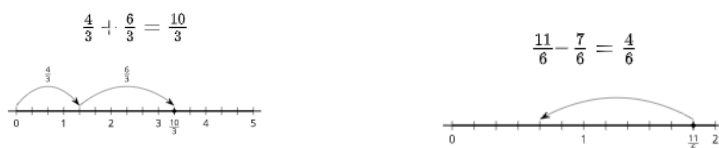
In this unit, students deepen their understanding of how fractions can be composed and decomposed, and learn about operations on fractions.

In grade 3, students partitioned a whole into equal parts and identified one of the parts as a unit fraction. They learned that non-unit fractions and whole numbers are composed of unit fractions. They used visual fraction models, including tape diagrams and number lines, to represent and compare fractions. In a previous unit, students extended that work and reasoned about fraction equivalence.

Here, students multiply fractions by whole numbers, add and subtract fractions with the same denominator, and add tenths and hundredths. They rely on familiar concepts and representations to do so. For instance, students had represented multiplication on a tape diagram, with equal-size groups and a whole number in each group. Here, they use a tape diagram that shows a fraction in each group.



In earlier grades, students used number lines to represent addition and subtraction of whole numbers. Here, they use number lines to represent the decomposition of fractions into sums, and to reason about addition and subtraction of fractions with the same denominator, including mixed numbers.



Students then apply these skills in the context of measurement and data. They analyze line plots showing fractional lengths and find sums and differences to answer questions about the data.

Lastly, students use fraction equivalence to find sums of tenths and hundredths. For instance, to find $\frac{3}{10} + \frac{15}{100}$, they reason that $\frac{3}{10}$ is equivalent to $\frac{30}{100}$, so the sum is $\frac{30}{100} + \frac{15}{100}$, which is $\frac{45}{100}$.

Topic Titles:

- **Section A: Equal Groups of Fractions**

- Recognize that $n \times \frac{a}{b} = \frac{(n \times a)}{b}$.
- Represent and explain that a fraction a/b is a multiple of $\frac{1}{b}$, namely $a \times \frac{1}{b}$.
- Represent and solve problems involving multiplication of a fraction by a whole number.

- **Section B: Addition and Subtraction of Fractions**

- Create and analyze line plots that display measurement data in fractions of a unit ($\frac{1}{8}, \frac{1}{4}, \frac{1}{2}$).
- Represent and solve problems that involve the addition and subtraction of fractions and mixed numbers, including measurements presented in line plots.
- Use various strategies to add and subtract fractions and mixed numbers with like denominators.

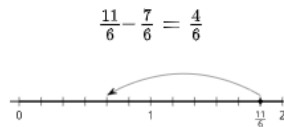
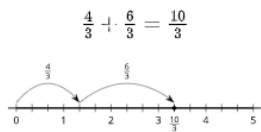
- **Section C: Addition of Tenths and Hundredths**

- Reason about equivalence to add tenths and hundredths.
- Reason about equivalence to solve problems involving addition and subtraction of fractions and mixed numbers.

Coherence: How does this unit build on and connect to prior knowledge and learning?

In grade 3, students partitioned a whole into equal parts and identified one of the parts as a unit fraction. They learned that non-unit fractions and whole numbers are composed of unit fractions. They used visual fraction models, including tape diagrams and number lines, to represent and compare fractions. In a previous unit, students extended that work and reasoned about fraction equivalence.

In earlier grades, students used number lines to represent addition and subtraction of whole numbers. Here, they use number lines to represent the decomposition of fractions into sums, and to reason about addition and subtraction of fractions with the same denominator, including mixed numbers.



Students then apply these skills in the context of measurement and data. They analyze line plots showing fractional lengths and find sums and differences to answer questions about the data.

Essential Questions:

1. How do we use what we know about multiples when understanding non-unit fractions?
2. Why do we need to know how to add and subtract fractions?

Enduring Understanding:

Non-unit fractions can be thought of as multiples, or groups of, unit fractions. A fraction $\frac{a}{b}$ is a multiple, or group of, $\frac{1}{b}$. We can use our knowledge of multiples to solve problems involving multiplication of a fraction by a whole number.

Fractions are found in our everyday lives. Fractions can be used to display and interpret data, in measurement, and in everyday situations. We need to be able to add and subtract different

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| <p>3. How do we find equivalent fractions?</p> | <p>types of fractions flexibly, efficiently, and accurately in order to find and analyze solutions.</p> <p>We can use what we know about multiples to find equivalent fractions with denominators of 10 and 100. In order to solve real-world problems, we need to be able to use fraction equivalence to add and subtract.</p> | |
| <p>What Students Will Know:</p> <ul style="list-style-type: none"> ● equal groups of fractions ● interpreting diagrams ● multiplying fractions by a whole number ● multiplication expressions ● fraction decomposition ● fraction sums on a numberline ● fraction differences on a numberline ● subtract fractions from whole numbers ● add and subtract fractions ● create line plots ● analyze data from line plots ● solve problems involving measurement data on line plots ● add tenths and hundredths | <p>What students will do:</p> <ul style="list-style-type: none"> ● Interpret and relate descriptions, drawings, and multiplication expressions that represent equal groups of unit fractions. ● Interpret and use diagrams and expressions to represent and find the product of a whole number and a unit fraction. ● Evaluate multiplication expressions and recognize that $n \times \frac{1}{b} = \frac{n}{b}$. ● Recognize that $n \times \frac{a}{b} = \frac{n \times a}{b}$ ● Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction. ● Write equivalent expressions for the multiplication of a fraction by a whole number and explain or show that the expressions are equivalent. ● Represent and solve problems involving multiplication of a fraction by a whole number. ● Recognize that a fraction can be decomposed into a sum of fractions with the same denominator. ● Write equations to represent fraction decomposition. ● Decompose fractions greater than 1 into a sum of a whole number and a fraction less than 1. ● Reason about addition and subtraction of fractions with the same denominator using a number line. ● Subtract fractions from whole numbers and mixed numbers by decomposing numbers and reasoning about equivalence. | <p>Unit Specific Vocabulary:</p> <p>common denominator composite number denominator equivalent fractions factor pair mixed number multiple numerator prime number</p> <p>Academic vocabulary</p> <p>compose decompose equal groups diagrams expression evaluate number line line plots Tenths Hundredths</p> |

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| | <ul style="list-style-type: none"> ● Add and subtract fractions (including mixed numbers) with the same denominator. ● Analyze strategies for reasoning about sums and differences of fractions with the same denominator. ● Analyze and interpret fractional measurement data on line plots. ● Organize measurement data in fractions of a unit ($\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$) onto line plots. ● Use information on line plots to solve problems involving addition and subtraction of fractions and mixed numbers. ● Use equivalence to reason about addition and subtraction problems. ● Use equivalent fractions to add tenths and hundredths. ● Find the sum of three or more tenths and hundredths, using the commutative and associative properties strategically. ● Interpret and solve problems that involve the addition, subtraction, and multiplication of fractions. | |
| <p>Entry Level Assessment and Connection to Unit:</p> <p>Grade 4 Unit 3 Entry Level Assessment</p> | <p>Unit Materials, Resources and Technology:</p> <ul style="list-style-type: none"> ● Illustrative Mathematics ● Instructional Routines and Math Language Routines ● Grade 4 Unit 3 Glossary ● Grade 4 Glossary ● Required Materials ● IM en Español ● Grade 4 en Español ● Pacing Guide and Dependency Diagrams K-5. | |

Opportunities for Interdisciplinary Connections:

Baking can be a great way to showcase multiplying fractions. Students can investigate how repeated addition can also be seen as multiplication expressions. Students can utilize different measuring cups to determine the sum of different expressions such as $\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$ and compare it to the product of $3 \times \frac{1}{3}$.

Any links, attachments and resources:

[Instructional Routines Document](#)

[Family Support Materials Unit 3](#)

Planning Ideas:

[Components of a Typical IM Lesson](#)

[What To Know About IM When Planning](#)

[Gr 4 Where to Find the Mathematical Practices in the Units](#)

[Assessing the Mathematical Practices](#)

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| Topic # 1 (Section A) | Topic Name: Equal Groups of Fractions | Duration: Recommended: 6 days (6 lessons) |
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Topic Description:

Section Learning Goals:

- Recognize that $n \times \frac{a}{b} = \frac{(n \times a)}{b}$.
- Represent and explain that a fraction $\frac{a}{b}$ is a multiple of $\frac{1}{b}$, namely $a \times \frac{1}{b}$.
- Represent and solve problems involving multiplication of a fraction by a whole number.

In this section, students extend their earlier understanding of multiplication as equal groups of whole numbers of objects to now include equal groups of fractional pieces.

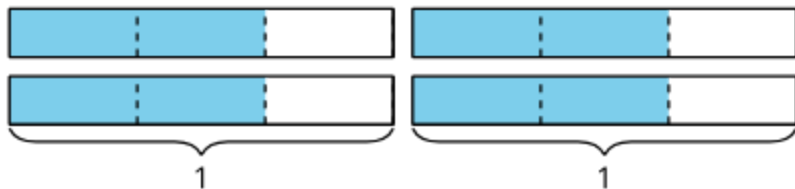
How many do you see? How do you see them?



Students begin by reasoning about groups containing unit fractions. For instance, they interpret the 5 plates with half an orange each as $5 \times \frac{1}{2}$, which is $\frac{5}{2}$. Later, they also reason about groups of non-unit fractions and write expressions to represent the quantities. For instance, 5 groups of $\frac{3}{4}$ can be expressed as $5 \times \frac{3}{4}$ or $\frac{15}{4}$.

Later, students reason with diagrams and equations. Through repeated reasoning, they see regularity in the product of a whole number and a fraction (MP8). The numerator in the resulting fraction is the product of the whole number and the numerator of the fractional factor, and the denominator is the same as in the fractional factor.

$$4 \times \frac{2}{3} = \frac{8}{3}$$



These diagrams also help students see that some fractions can be represented by more than one multiplication expression. Students can reason that $\frac{8}{3}$ is $8 \times \frac{1}{3}$, which is also equivalent to $4 \times 2 \times \frac{1}{3}$ and $2 \times 4 \times \frac{1}{3}$, and is therefore equivalent to $4 \times \frac{2}{3}$ and $2 \times \frac{4}{3}$, respectively.

By circling the diagram in various ways, students can visualize the different combinations of groups, understand their equivalence, and observe the associative property of multiplication. In doing this work, students practice looking for and making use of structure (MP7).

Students then solve problems that involve fraction multiplication, using diagrams and equations to show their reasoning. These diagrams will also be useful in later grades, when students make sense of fractions as quotients.

Competencies Addressed:

Understanding and Applying Number Systems

7. I can use my understanding of operations with whole numbers to multiply a fraction by a whole number to solve problems. **(4.NF.B.4a-c)** (lessons 3.1 - 3.6)

Essential Question and Enduring Understanding Addressed in this Topic:

Essential Question

How do we use what we know about multiples when understanding non-unit fractions?

Enduring Understanding

Non-unit fractions can be thought of as multiples, or groups of, unit fractions. A fraction

$\frac{a}{b}$ is a multiple, or group of, $\frac{1}{b}$. We can use our knowledge of multiples to solve problems involving multiplication of a fraction by a whole number.

In this Topic, students will know:

- equal groups of fractions
- interpreting diagrams
- multiplying fractions by a whole number
- multiplication expressions

Topic Vocabulary:

common denominator
 composite number
 denominator
 equivalent fractions
 mixed number
 multiple
 numerator

Academic vocabulary

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| | <p>Equivalent Decompose Sums Unit fraction Equation Numerator Denominator Number line Sums of fractions Mixed number Expression Value Statement Diagram Value Difference Mixed number Equivalent fraction Line plot Measurement Data point Error Fractional data Analyze</p> |
| <p>In this Topic, students will be able to:</p> <ul style="list-style-type: none"> ● Interpret and relate descriptions, drawings, and multiplication expressions that represent equal groups of unit fractions. ● Interpret and use diagrams and expressions to represent and find the product of a whole number and a unit fraction. ● Evaluate multiplication expressions and recognize that $n \times \frac{1}{b} = \frac{n}{b}$. ● Recognize that $n \times \frac{a}{b} = \frac{n \times a}{b}$. | <p>Plan for Student Reflection:</p> <p>Student Journal Prompts and Reflection Practices</p> <hr/> <p>Teacher Journal Reflection Questions:</p> <p>Lesson 1: Which question did you ask today that best supported students' understanding of multiplication of a fraction by a whole number? What did students say or do that showed the</p> |

question was effective?

Lesson 2: Revisit class norms and routines. Are all students contributing to the conversation? Do some students' ideas seem to hold more value in the dynamics of the group? Are there any adjustments you might make so that all students do math tomorrow?

Lesson 3: In tomorrow's lesson, students multiply a non-unit fraction by a whole number. How can students apply their understanding from today to reason about these expressions tomorrow?

Lesson 4: What part of the lesson went really well today in terms of students' learning? What did you do that made that part go well?

Lesson 5: What did you say, do, or ask during the lesson synthesis that helped students be clear on the learning of the day?


Lesson 6: What new mathematical connections did you see students make today as they were solving problems about multiplication of fractions? How can those connections be leveraged in upcoming work?

Utilize additional strategies for Teacher Reflection:

- Reviewing formative assessments
- Developing scaffolds
- Collaborative scoring
- PLCs
- Planning for small groups

Topic 1 (Section A) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

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| Task Title: Topic 1 - Equal Groups of Fractions | Grade Level and Unit: Grade 4 Unit 3 |
| Description of Task: In this activity, students are presented with descriptions of situations and equivalent multiplication expressions. They match each description to an expression that could represent the situation and see that more than one expression can be used, depending on how they interpret the situation. Likewise, students find that one expression can be used to represent different descriptions (MP2). | Purpose of Task: Students discuss their matching decisions, analyze how the expressions are related, and consider revising the matches they made, if appropriate. When students discuss and justify their decisions they are creating viable arguments and critiquing one another's reasoning (MP3). |
| Background of Students/Learning Progression: In grade 3, students represented multiplication of whole numbers with arrays, equal-group drawings, area diagrams, and expressions. In an earlier unit, students used diagrams to represent and compare fractions. In this unit, they extend their understanding of multiplication to include equal groups of unit fractions while using familiar representations to support their thinking. | Ensure all competencies are addressed in the task: <ul style="list-style-type: none"><input type="checkbox"/> Yes, all competencies are addressed<input type="checkbox"/> No - Task needs modification |
| Getting Started: Show students the following image:  Ask students the following question, "About what fraction of the pancake stack is on the fork? If you ate 6 bites of the same size, how much of the stack would be eaten? Explain or show your reasoning. (4.NF.B.4)" | |

Learning Cycle Model

Section A

| IM Lesson | L1: Equal Groups of Unit Fractions | L2: Representations of Equal Groups of Fractions | L3: Patterns in Multiplication | L4: Equal Groups of Non-Unit Fractions | L5: Equivalent Multiplication Expressions | L6: Problems with Equal Groups of Fractions |
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| Learning Cycle Model | Making Meaning | Making Meaning | Investigation | Investigation | Investigation | Create & Produce |
| Naugatuck Math Competency | 4.NS.7 | 4.NS.4, 4.NS.7 | 4.NS.7 | 4.NS.7 | 4.NS.7 | 4.NS.7 |
| Math Practice Standards | MP2 | MP2 | MP3 | MP8 | MP7, 8 | MP2, 3 |
| Lesson Purpose | The purpose of this lesson is for students to interpret and relate descriptions, drawings, and multiplication expressions that represent equal groups of unit fractions. | The purpose of this lesson is for students to interpret and generate diagrams and expressions that represent multiplication of a whole number and a unit fraction in order to find the value of the product. | The purpose of this lesson is for students to understand that every fraction can be written as the product of a whole number and unit fraction. | The purpose of this lesson is to apply understandings from previous lessons to multiply a non-unit fraction by a whole number. | The purpose of this lesson is for students to write equivalent expressions for the multiplication of a whole number and a unit fraction and explain the equivalence. | The purpose of this lesson is for students to apply their understanding about multiplication of a fraction by a whole number to solve problems. |
| Vocabulary Focus | Expression, story, situation, equal-size groups | Expression, factors, multiples, diagram, value, equal groups | Expressions, value, diagram, pattern, groups, unit fraction, numerator, product, whole number | Groups, diagrams, equal groups, non-unit fractions, expression, value, numerator, product, denominator | Expression, groups, equation, numerator, denominator | Statement, fraction form, expression, situation |
| Lesson Materials/Resources | Lesson 1 Slides Teacher Presentation Materials Student Pages | Lesson 2 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Create a set of cards from the blackline master, Expressions | Lesson 3 Slides Teacher Presentation Materials Student Pages Activity 2: <ul style="list-style-type: none"> Provide a sheet of paper for each student | Lesson 4 Slides Teacher Presentation Materials Student Pages | Lesson 5 Slides Teacher Presentation Materials Student Pages | Lesson 6 Slides Teacher Presentation Materials Student Pages Activity 2: <ul style="list-style-type: none"> Prior to the lesson, write the following 5 expressions on separate posters |

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| | Cool-down: Sandwiches on Plates | and Diagrams , for each group of 2 Cool-down: Equal Groups of Fractions | Cool-down: Fraction Multiplication | Cool-down: What's the Value? | Cool-down: Expressions for Fractions | and post them around the room <ul style="list-style-type: none"> • $4 \times (2 \times \frac{1}{10})$ • $4 \times \frac{2}{10}$ • $8 \times \frac{1}{10}$ • $2 \times (4 \times \frac{1}{10})$ • $2 \times \frac{4}{10}$ Cool-down: The Same or Not the Same? |
| Assessment | Formative Assessment Strategies: observation, questioning, student discourse: Monitoring Sheet See : Section A Checkpoint , Section A Checkpoint Teacher Guide | | | | | |
| | | | | | | Section A Practice Problems |
| Suggested Centers | Rolling for Fractions (3-5), Stage 1: Equivalent Fractions (Supporting) | Rolling for Fractions (3-5), Stage 1: Equivalent Fractions (Supporting) | Rolling for Fractions (3-5), Stage 1: Equivalent Fractions (Supporting) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) |
| | Compare (1-5), Stage 5: Fractions (Supporting) | Compare (1-5), Stage 5: Fractions (Supporting) | Compare (1-5), Stage 5: Fractions (Supporting) | Rolling for Fractions (3-5), Stage 1: Equivalent Fractions (Supporting) Compare (1-5), Stage 5: Fractions (Supporting) | Estimate and Measure (1-4), Stage 3: Quarter Inches (Supporting) Target Measurements (2-5), Stage 2: Quarter Inches (Supporting) | Estimate and Measure (1-4), Stage 3: Quarter Inches (Supporting) Target Measurements (2-5), Stage 2: Quarter Inches (Supporting) |

Making Meaning:

Students begin by looking at situations that involve fractional amounts of food items. Students may rely on given images and descriptions, their own drawings, their understanding of fractions, and what they know about writing and evaluating multiplication expressions for equal groups of whole-number objects. In future lessons, students will use more abstract diagrams and generalize the process of multiplying a whole number and a unit fraction.

In Lesson 2, students interpret and relate multiplication expressions and diagrams that represent products of whole numbers and fractions. After matching expressions and diagrams in a card-sort activity, they practice using diagrams and expressions to find the result of multiplying a whole number and a fraction. They draw a diagram given a multiplication expression, or write an expression given a diagram (MP2).

[Lesson 1: Equal Groups of Unit Fractions](#)

- The purpose of this lesson is for students to interpret and relate descriptions, drawings, and multiplication expressions that represent equal groups of unit fractions.
- [Teacher presentation materials](#)
- [Slides](#)

[Lesson 2: Representations of Equal Groups of Fractions](#)

- The purpose of this lesson is for students to interpret and generate diagrams and expressions that represent multiplication of a whole number and a unit fraction in order to find the value of the product.
- [Teacher presentation materials](#)
- [Slides](#)

Investigation:

In Lesson 3, students analyze two sets of multiplication expressions: one in which the number of groups is kept constant, and another in which the size of each group (a unit fraction) is kept constant. They look for regularity as they reason repeatedly about the expressions and their values (MP8). The patterns that emerge in the series of expressions formalize their prior observations about the value of $a \times \frac{1}{b}$ as $\frac{a}{b}$. They also enable students to see any fraction as a product of a whole number and unit fraction.

Note that students may write either $a \times \frac{1}{b} = \frac{a}{b}$ or $\frac{1}{b} \times a = \frac{a}{b}$ as long as they understand what each factor represents. Teachers can reinforce the meaning of each factor by consistently writing the multiplication in this order: **number of groups x size of each group=total amount**. This corresponds to how we tend to express situations with equal groups, which in the case of fractional amounts, is “_____ (whole number) groups of _____ (fraction).”

In Lesson 4, students notice that they can multiply any fraction and a whole number by reasoning about the number of groups and amount in each group. They generalize that they can multiply the numerator by the whole number to find the number of parts. They also see that the denominator remains the same because the size of each part is the same. In other words: $n \times \frac{a}{b} = \frac{n \times a}{b}$.

In Lesson 5, students apply these understandings to explain how two multiplication expressions are equivalent. Students use what they know about multiple groups of unit fractions to explain how two different expressions result in the same product (MP7). (Students are not expected to use the term “equivalent expressions.”)

[Lesson 3: Patterns in Multiplication](#)

- The purpose of this lesson is for students to understand that every fraction can be written as the product of a whole number and unit fraction.
- [Teacher presentation materials](#)
- [Slides](#)

[Lesson 4: Equal Groups of Non-Unit Fractions](#)

- The purpose of this lesson is to apply understandings from previous lessons to multiply a non-unit fraction by a whole number.
- [Teacher presentation materials](#)
- [Slides](#)

[Lesson 5: Equivalent Multiplication Expressions](#)

- The purpose of this lesson is for students to write equivalent expressions for the multiplication of a whole number and a unit fraction and explain the equivalence.
- [Teacher presentation materials](#)
- [Slides](#)

Create and Produce:

Students may choose to draw diagrams, write equations, or make use of patterns to understand the situations and answer the questions. As students make sense of representations and quantities in context, they practice reasoning quantitatively and abstractly (MP2).

[Lesson 6: Problems with Equal Groups of Fractions](#)

- The purpose of this lesson is for students to apply their understanding about multiplication of a fraction by a whole number to solve problems.
- [Teacher presentation materials](#)
- [Slides](#)

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| <p>Communicate and Present:</p> <p>“Today, we matched expressions to situations. We learned that several expressions can represent the same situation.”</p> <p>Invite 1–2 students who chose different expressions for the same problem (one of the last two problems in the milkshake activity) to share. Record their ideas for all to see.</p> | <p>Reflection: (Lesson 6: Cool-Down)</p> <p>“Who can explain how each expression matches the problem?” (On Thursday, there were 4 separate orders of 1 serving each, or $4 \times \frac{1}{10}$, that were made by 2 people, or $2 \times (4 \times \frac{1}{10})$. This is also the same as $2 \times \frac{4}{10}$.)</p> <p>“Did you notice something about the answers to the problems?” (They are all the same. They are all $\frac{8}{10}$.)</p> <p>“Why do you think they are all the same?” (They all involve 8 groups of $\frac{1}{10}$.)</p> <ul style="list-style-type: none"> • IM Reflection Practices |
| <p>Notes:</p> | <p>Complete File with Resources and Task:</p> <p>Task-Based Learning Plan Format for Gr 4 Unit 3 Topic 1</p> |

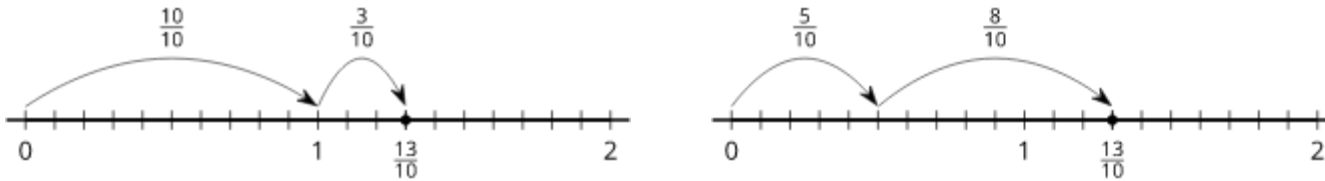
Topic # 2 (Section B)**Topic Name: Addition and Subtraction of Fractions****Duration:**

Recommended: 8 days (8 lessons)

Topic Description:

In this section, students learn to add and subtract fractions by decomposing them into sums of smaller fractions, writing equivalent fractions, and using number lines to support their reasoning.

Students begin by thinking about a fraction as a sum of unit fractions with the same denominator and then as a sum of other smaller fractions. They represent different ways to decompose a fraction by drawing “jumps” on number lines and writing different equations.

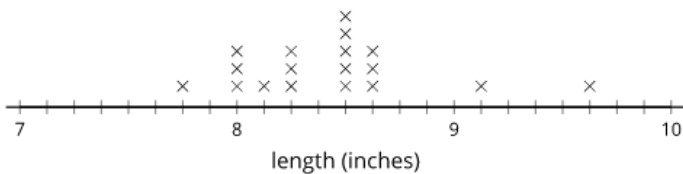


Working with number lines helps students see that a fraction greater than 1 can be decomposed into a whole number and a fraction, and then be expressed as a mixed number. This can in turn help us add and subtract fractions with the same denominator. For example, to find the value of $3 - \frac{2}{5}$, it helps to first decompose the 3 into $2 + \frac{5}{5}$, and then subtract $\frac{2}{5}$ from the $\frac{5}{5}$.

Later in the section, students organize fractional length measurements ($\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ inch) on line plots. They apply their ability to interpret line plots and to add and subtract fractions to solve problems about measurement data.

*What is the difference between the largest and smallest shoe lengths?
Explain or show your reasoning.*

Fourth-grade Shoe Lengths



Section Learning Goals

- Create and analyze line plots that display measurement data in fractions of a unit ($\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$).
- Represent and solve problems that involve the addition and subtraction of fractions and mixed numbers, including measurements presented in line plots.
- Use various strategies to add and subtract fractions and mixed numbers with like denominators.

Competencies Addressed:

Understanding and Applying Number Systems

6. I can add and subtract mixed numbers with like denominators to solve word problems. (4.NF.B.3a-d)
7. I can use my understanding of operations with whole numbers to multiply a fraction by a whole number to solve problems. (4.NF.B.4a-c)

Measurement and Data Investigations

2. I can create and interpret a line plot to solve problems, including data with fractions of a unit. (4.MD.B.)

Essential Question and Enduring Understanding Addressed in this Topic:

Essential Question

Why do we need to know how to add and subtract fractions?

Enduring Understanding

Fractions are found in our everyday lives.

Fractions can be used to display and interpret data, in measurement, and in everyday situations. We need to be able to add and subtract different types of fractions flexibly, efficiently, and accurately in order to find and analyze solutions.

In this Topic, students will know:

- fraction decomposition
- fraction sums on a numberline
- fraction differences on a numberline
- subtract fractions from whole numbers.
- add and subtract fractions
- create line plots
- analyze data from line plots
- solve problems involving measurement data on line plots

Topic Vocabulary:

Academic vocabulary

- Equivalent
- Decompose
- Sums
- Unit fraction
- Equation
- Numerator
- Denominator
- Number line
- Sums of fractions

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| | <p>Mixed number Expression Value Statement Diagram Value Difference Mixed number Equivalent fraction Line plot Measurement Data point Error Fractional data Analyze</p> |
| <p>In this Topic, students will be able to: Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction.</p> <ul style="list-style-type: none"> ● Recognize that a fraction can be decomposed into a sum of fractions with the same denominator. ● Write equations to represent fraction decomposition. ● Decompose fractions greater than 1 into a sum of a whole number and a fraction less than 1. ● Reason about addition and subtraction of fractions with the same denominator using a number line. ● Subtract fractions from whole numbers and mixed numbers by decomposing numbers and reasoning about equivalence. ● Add and subtract fractions (including mixed numbers) with the same denominator. ● Analyze strategies for reasoning about sums and differences of fractions with the same denominator. ● Analyze and interpret fractional measurement data on line plots. ● Organize measurement data in fractions of a unit ($\frac{1}{8}, \frac{1}{4}, \frac{1}{2}$) onto line plots. ● Use information on line plots to solve problems involving addition and subtraction of fractions and mixed numbers. | <p>Plan for Student Reflection:</p> <p>Student Journal Prompts and Reflection Practices</p> <hr/> <p>Teacher Journal Reflection Questions: Lesson 7: Reflect on the times you observed students listening to one another's ideas today in class. What norms would help each student better attend to their classmates' ideas in future lessons? Lesson 8: Students have previously represented whole numbers and fractions on the number line. How did you leverage that experience to help them reason about addition of fractions on the number line?</p> |

Lesson 9: Based on students' work today, what did you learn about their understanding of the relationships between addition and subtraction? How will you use these insights to prepare for upcoming work?

Lesson 10: How did the student work that you selected impact the direction of class discussion? How would you adjust your selection if you teach the lesson again?

Lesson 11: Reflect on evidence of student thinking that you observed today. Whose thinking was voiced and heard? Whose thinking was not but could have enriched the conversations? What prompts or structures might better enable the latter to share their voice and reasoning?

Lesson 12: Which way(s) of reasoning about sums and differences of fractions did most students use today? What suggestions could you offer to improve students' flexibility in adding and subtracting fractions?

Lesson 13: Today's lesson encouraged small-group collaboration. How did students interact with each other's ideas today in the work? How can you ensure in future small-group collaborations that all students' voices are heard?

Lesson 14: Which question asked during this lesson generated the most discourse? What was it about this question to motivate student

thinking? How might you use the structure of this question moving forward in upcoming lessons?

Utilize additional strategies for Teacher Reflection:

- Reviewing formative assessments
- Developing scaffolds
- Collaborative scoring
- PLCs
- Planning for small groups

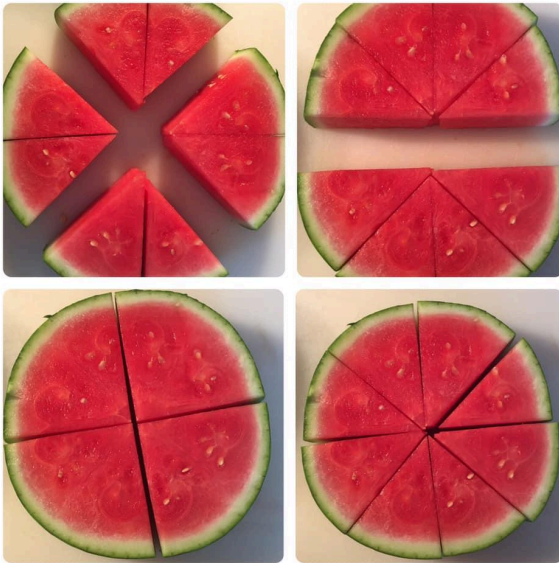
Topic 2 (Section B) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

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| Task Title: Topic 2 - Addition and Subtraction of Fractions | Grade Level and Unit: Grade 4 Unit 3 |
| Description of Task: In this activity, students analyze a line plot that is incomplete. They relate the list of given fractions to the data on the line plot and use their understanding of equivalence to determine the missing data points. | Purpose of Task: Students also continue to interpret the data and add and subtract fractions to solve problems in context (MP2). |
| Background of Students/Learning Progression: In previous lessons, students expressed a fraction $\frac{a}{b}$ as a product of a unit fraction $\frac{1}{b}$ and a whole number a . | Ensure all competencies are addressed in the task: <input type="checkbox"/> Yes, all competencies are addressed <input type="checkbox"/> No - Task needs modification |

Getting Started:

Show the following image to students.



Ask students, "What equivalent fractions do you see represented in the picture? Record them and explain how you know they are equivalent."

| Learning Cycle Model Section B | | | | | | | | |
|-----------------------------------|---|--|---|--|--|---|--|---|
| IM Lesson | L7: Fractions as Sums | L8: Addition of Fractions | L9: Differences of Fractions | L10: The Numbers in Subtraction | L11: Subtract Fractions Flexibly | L12: Sums and Differences of Fractions | L13: Fractional Measurements on Line Plots | L14: Problems about Fractional Measurement Data |
| Learning Cycle Model | Making Meaning | Making Meaning | Making Meaning | Making Meaning | Investigation | Investigation | Investigation | Create & Produce |
| Naugatuck Math Competency | 4.NS.6 | 4.NS.6 | 4.NS.6 | 4.NS.6 | 4.NS.6 | 4.NS.6 | 4.NS.6, 4.MD.2 | 4.NS.6, 4.MD.2 |
| Math Practice Standards | MP8 | - | MP3 | MP7 | MP1, 3, 7 | MP6, 7 | MP6 | MP1, 2 |
| Lesson Purpose | The purpose of this lesson is for students to decompose a fraction into a sum of fractions with the same denominator in more than one way, and to write an equation for each decomposition. | The purpose of this lesson is for students to use a number line to reason about addition of fractions with the same denominator, and to decompose fractions greater than 1 into a whole number and a fraction less than 1. | The purpose of this lesson is for students to use a number line to reason about subtraction of fractions with the same denominator. | The purpose of this lesson is for students to recognize that a fraction can be subtracted from a whole number by writing an equivalent fraction for the whole number. It can also be done by decomposing the whole number, the fraction, or both, into a sum of fractions with the same denominator. | The purpose of this lesson is for students to subtract fractions, including mixed numbers, by decomposing numbers and writing equivalent fractions, and to recognize when these strategies are useful for finding differences. | The purpose of this lesson is for students to consider strategies for adding and subtracting fractions with the same denominator, including mixed numbers, and to recognize when it is helpful to decompose numbers or write equivalent fractions when finding sums and differences of fractions. | The purpose of this lesson is for students to display a set of measurements in fractions of a unit ($\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$) on a line plot and interpret the data. Students also add and subtract fractions to answer questions about data presented in line plots. | The purpose of this lesson is for students to solve problems using information presented in line plots. |
| Vocabulary Focus | Equivalent, decompose, sums, unit fraction, equation, | Number line, sums of fractions, mixed number, expression, value, equivalent | Statement, diagram, value, difference | Expression, operation, decomposing | Expression, decompose, sum, subtract | Expression, equation, value, sums, differences, mixed numbers, | Line plot, measurement, nearest, equivalence, difference | Difference, data point, line plot, error, plot, analyze, fractional data |

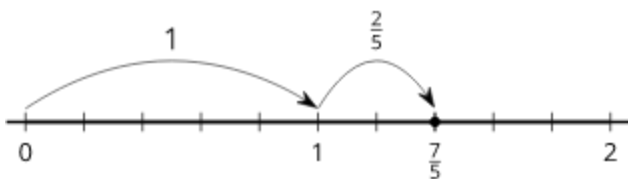
| | numerator, denominator | | | | | equivalent fractions | | |
|---|---|---|---|--|--|--|---|---|
| Lesson Materials/ Resources | Lesson 7 Slides | Lesson 8 Slides | Lesson 9 Slides | Lesson 10 Slides | Lesson 11 Slides | Lesson 12 Slides | Lesson 13 Slides | Lesson 14 Slides |
| | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials | Teacher Presentation Materials |
| | Student Pages | Student Pages | Student Pages | Student Pages | Student Pages | Student Pages | Student Pages | Student Pages |
| | <p><i>For Activity 1:</i></p> <ul style="list-style-type: none"> ● Gather $\frac{1}{4}$ cup and $\frac{3}{4}$ cup measuring cups for groups of 2 <p>Cool-down: Make a Sum of $\frac{7}{4}$</p> | <p><i>For Activity 3:</i></p> <ul style="list-style-type: none"> ● Create a set of cards from the blackline master (Make Two Jumps) for each group of 2 <p>Cool-down: Lucky Thirteen-tenths</p> | <p><i>For Activity 3:</i></p> <ul style="list-style-type: none"> ● Create a set of cards from the blackline master (Make a Jump, Subtraction Edition) for each group of 2 <p>Cool-down: Differences of Fifths</p> | <p><i>For Activity 2:</i></p> <ul style="list-style-type: none"> ● Create a set of cards from the blackline master (Card Sort: Twelfths) for each group of 2 <p>Cool-down: Two Differences</p> | <p><i>For Lesson Synthesis:</i></p> <ul style="list-style-type: none"> ● Each group of 4 needs tools for creating a visual display during the lesson synthesis <p>Cool-down: A Shorter Strip, Please</p> | <p><i>For Activity 1:</i></p> <ul style="list-style-type: none"> ● Each student needs a used colored pencil <p>Cool-down: Jada's Pencil Data</p> | <p>Cool-down: How Would You Find the Difference?</p> | <p>Cool-down: Fourth-grade Height Data</p> |
| Formative Assessment Strategies: observation, questioning, student discourse - Monitoring Sheet See : Section B Checkpoint , Section B Checkpoint Teacher Guide | | | | | | | | |
| | | | | | | | | Section B Practice Problems |

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| Suggested Centers | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing) | Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing) | Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing) | Estimate and Measure (1-4), Stage 4: Eighth Inches (Addressing) | Creating Line Plots (2-5), Stage 3: Eighth Inches, Add and Subtract (Addressing) |
| | Estimate and Measure (1-4), Stage 3: Quarter Inches (Supporting) | Estimate and Measure (1-4), Stage 3: Quarter Inches (Supporting) | Estimate and Measure (1-4), Stage 3: Quarter Inches (Supporting) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing) | Target Measurements (2-5), Stage 3: Eighth Inches (Addressing) | Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing) |
| | Target Measurements (2-5), Stage 2: Quarter Inches (Supporting) | Target Measurements (2-5), Stage 2: Quarter Inches (Supporting) | Target Measurements (2-5), Stage 2: Quarter Inches (Supporting) | Creating Line Plots (2-5), Stage 2: Quarter Inches (Supporting) | Creating Line Plots (2-5), Stage 2: Quarter Inches (Supporting) | Creating Line Plots (2-5), Stage 2: Quarter Inches (Supporting) | Creating Line Plots (2-5), Stage 2: Quarter Inches (Supporting) | |

Making Meaning

In previous lessons, students expressed a fraction $\frac{a}{b}$ as a product of a unit fraction $\frac{1}{b}$ and a whole number a . In Lesson 7, students transition to seeing a fraction $\frac{a}{b}$ as a sum of unit fractions and non-unit fractions with the same denominator. Students see that a fraction with a numerator greater than 1 can be decomposed into sums in different ways. They write equations to record the decomposition (for example, $\frac{4}{6} = \frac{3}{6} + \frac{1}{6}$). Later, they write equations to represent addition of fractions with the same denominator.

A number line can illustrate the number of unit fractions that make a whole number. This in turn allows students to see that a fraction greater than 1 can be decomposed into a whole number and a fraction less than 1, preparing them to work with mixed numbers. For instance, on a number line partitioned into fifths, the fraction $\frac{7}{5}$ is 7 fifths away from 0 and 2 fifths away from 1, so we can express $\frac{7}{5}$ as 1 and $\frac{2}{5}$. One way to illustrate that sum is by drawing “jumps” on the number line.



Note that in grade 3, students came across mixed numbers in the context of measurement. For instance, they use inch rulers to measure lengths greater than 1 inch to the nearest halves and fourths, express them using numbers such as $2\frac{1}{4}$ and $5\frac{1}{2}$. They did not, however, reason about mixed numbers as sums of smaller fractions or sums of a fraction and a whole number.

As in earlier grades, students may think about subtracting as taking away a number from another number, or as finding an unknown addend. The way they represent differences of fractions on a number line may vary accordingly.

In Lesson 10, students apply these insights, as well as their knowledge of equivalent fractions from an earlier unit and from grade 3, to find differences of a whole number and a fraction.

Lesson 7: Fractions as Sums

- The purpose of this lesson is for students to decompose a fraction into a sum of fractions with the same denominator in more than one way, and to write an equation for each decomposition.
- [Teacher presentation materials](#)
- [Slides](#)

Lesson 8: Addition of Fractions

- The purpose of this lesson is for students to use a number line to reason about addition of fractions with the same denominator, and to decompose fractions greater than 1 into a whole number and a fraction less than 1.
- [Teacher presentation materials](#)
- [Slides](#)

Lesson 9: Differences of Fractions

- The purpose of this lesson is for students to use a number line to reason about subtraction of fractions with the same denominator.
- [Teacher presentation materials](#)
- [Slides](#)

Lesson 10: The Numbers in Subtraction

- The purpose of this lesson is for students to recognize that a fraction can be subtracted from a whole number by writing an equivalent

fraction for the whole number. It can also be done by decomposing the whole number, the fraction, or both, into a sum of fractions with the same denominator.

- [Teacher presentation materials](#)
- [Slides](#)

Investigation:

In the previous lesson, students learned to subtract a fraction from a whole number numerically, by writing an equivalent fraction for the whole number or decomposing the whole number into a sum of fractions with the same denominator. Lesson 11 extends that work to include mixed numbers. It also prompts students to look for structure in subtraction expressions where decomposing one or both numbers makes the expression easier to evaluate (MP7). The work here builds students' ability to subtract fractions flexibly.

In this Lesson 12, they practice finding the value of sums and differences of fractions while also taking a closer look at their reasoning strategies. In the first activity, students complete addition and subtraction equations, each with a missing number. They then reflect on the steps they took and consider why they found certain ways of reasoning more productive than others. In the second activity, students examine and explain when it might be useful to decompose numbers when finding sums and differences of fractions. In explaining their answers and strategies, students need to be precise in their word choice and use of language (MP6).

An optional measuring activity is included in Lesson 13. While grade 4 standards do not require students to measure lengths or generate measurement data, measuring reinforces student understanding of the relative size of fractions and gives meaning to the context used in subsequent activities.

The activities in this lesson call for using colored pencils. If colored pencils are unavailable, substitute with regular pencils.

Lesson 11: Subtract Fractions Flexibly

- The purpose of this lesson is for students to subtract fractions, including mixed numbers, by decomposing numbers and writing equivalent fractions, and to recognize when these strategies are useful for finding differences.
- [Teacher presentation materials](#)
- [Slides](#)

Lesson 12: Sums and Differences of Fractions

- The purpose of this lesson is for students to consider strategies for adding and subtracting fractions with the same denominator, including mixed numbers, and to recognize when it is helpful to decompose numbers or write equivalent fractions when finding sums and differences of fractions.
- [Teacher presentation materials](#)
- [Slides](#)

Lesson 13: Fractional Measurements on Line Plots

- The purpose of this lesson is for students to display a set of measurements in fractions ($\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$) on a line plot and interpret the data. Students also add and subtract fractions to answer questions about data presented in line plots.
- [Teacher presentation materials](#)
- [Slides](#)

Create and Produce:

Previously, students organized and analyzed measurement data on a line plot. They also learned to express equivalent fractions (for example, they expressed 3 fourths as 6 eighths). In this lesson, they continue to use these skills, along with their knowledge of addition and subtraction of fractions with the same denominator, to solve problems involving fractional measurements.

Lesson 14: Problems about Fractional Measurement Data

- The purpose of this lesson is for students to solve problems using information presented in line plots.
- [Teacher presentation materials](#)
- [Slides](#)

Communicate and Present:

- Select students to display their completed line plot and to share how they decided which data points didn't get plotted.
- Highlight that one point that is missing could be Jada, Diego, or Han's, as the fractions that represent their change in shoe length, $1\frac{1}{4}$, are equivalent.
- Select other students to share their responses to questions about Han and Priya's shoe lengths.
- Then, focus the discussion on the last question about Tyler's error, his actual change in shoe length, and how the corrected value might affect the line plot.

Reflection: (Lesson 14 Cool-Down)

"Today we used our understanding of fractions to plot and analyze data on line plots. We also added and subtracted fractions to answer questions about measurement data."

"How was plotting fractional data in halves, fourths, and eighths on a line plot different from plotting whole numbers?" (With whole-number data, we could just count up or down from the labeled tick marks to know where to put a number. With fractions, sometimes it's necessary to think about equivalent fractions first to know where to put a data point. For example, the

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| | <p>number line might be partitioned into fourths, but the data might be in eighths or halves.)</p> <p>“The problems we saw today involved finding differences of two fractions. Did you find the line plots helpful for subtracting two fractions? Why or why not?” (Sample responses: Yes, because I could use the number line and tick marks to help us count up or down, or to know roughly what the difference would be. No, because I could reason about the difference mentally or figure it out on paper.)</p> <p>(Optional) In their math journals/notebooks, have students draw each math tool they explored in this Topic and write down/paste what it is. For example, they will draw connecting cubes and then could either copy the words or cut and paste the term from a list.</p> <ul style="list-style-type: none"> ● IM Reflection Practices |
| <p>Notes:</p> | <p>Complete File with Resources and Task:</p> <p>Task-Based Learning Plan Format for Gr 4 Unit 3 Topic 2</p> |

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| Topic # 3 (Section C) | Topic Name: Addition of Tenths and Hundredths | Duration: Recommended: 6 days (6 lessons) |
| <p>Topic Description: In this section, students apply their understanding of fraction equivalence to add tenths and hundredths.</p> <p>In the previous unit, students learned that $\frac{1}{10} = \frac{10}{100}$. They use this reasoning to add tenths and hundredths by generating equivalent fractions. They also apply what they learned in the previous section to strategically use decomposition and the associative and commutative properties to add three or more tenths and hundredths, including mixed numbers.</p> <p>This section ends with an optional lesson that allows students to apply what they have learned about multiplication, addition, and subtraction of fractions and mixed numbers to solve a design problem.</p> <p>Section Learning Goals</p> <ul style="list-style-type: none"> ● Reason about equivalence to add tenths and hundredths. ● Reason about equivalence to solve problems involving addition and subtraction of fractions and mixed numbers. | | |
| <p>Competencies Addressed:</p> <p>Understanding and Applying Number Systems</p> <p>5. I can apply my understanding of fractions for equivalence and comparing. (4.NF.A.1-2) (lessons 3.15-3.16)</p> <p>6. I can add and subtract mixed numbers with like denominators to solve word problems. (4.NF.B.3a-d) (lessons 3.15, 3.19 - 3.20)</p> <p>7. I can use my understanding of operations with whole numbers to multiply a fraction by a whole number to solve problems. (4.NF.B.4a-c) (lesson 3.18)</p> <p>8. I understand the relationship between fractions and decimals and can apply place value understanding to compare decimals. (4.NF.C.6-7, 4.NF.C.5) (lessons 3.16 - 3.19)</p> | | <p>Essential Question and Enduring Understanding Addressed in this Topic:</p> <p>Essential Question How do we find equivalent fractions?</p> <p>Enduring Understanding We can use what we know about multiples to find equivalent fractions with denominators of 10 and 100. In order to solve real-world problems, we need to be able to use fraction equivalence to add and subtract.</p> |
| <p>In this Topic, students will know:</p> <ul style="list-style-type: none"> ● fraction decomposition ● fraction sums on a numberline | | <p>Topic Vocabulary:</p> <p>Academic vocabulary</p> |

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| <ul style="list-style-type: none"> ● fraction differences on a numberline ● subtract fractions from whole numbers. ● add and subtract fractions ● add tenths and hundredths | <p>Mixed number Equivalent Numerator Denominator Tenths Hundredths Sums Expression Value Operations Situations Estimate Design</p> |
| <p>In this Topic, students will be able to: Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction.</p> <ul style="list-style-type: none"> ● Use equivalence to reason about addition and subtraction problems. ● Use equivalent fractions to add tenths and hundredths. ● Find the sum of three or more tenths and hundredths, using the commutative and associative properties strategically. ● Interpret and solve problems that involve the addition, subtraction, and multiplication of fractions. | <p>Plan for Student Reflection:</p> <p>Student Journal Prompts and Reflection Practices</p> <hr/> <p>Teacher Journal Reflection Questions:</p> <p>Lesson 15: How did the activities in today’s lesson prepare students to add tenths and hundredths in the next lesson? How will you connect the ideas around equivalent fractions to upcoming work?</p> <p>Lesson 16: Reflect on a time recently when your thinking about students’ understanding or reasoning changed. What led to the change in perspective? How will you alter your teaching practice to incorporate your new understanding?</p> |

Lesson 17: What questions that you asked supported students' thinking about equivalence and addition of fractions today? What did students say or do that showed they were effective?

Lesson 18: As you finish up this unit, reflect on the norms and activities that have supported each student in learning math. List the ways you have seen each student grow as a young mathematician throughout this work. List the ways you have seen yourself grow as a teacher. What will you continue to do and what will you improve upon in Unit 4?

Lesson 19: What evidence did you see of students thinking flexibly and choosing a method strategically as they worked to solve problems? For students who chose a fixed way of reasoning about fractional amounts, what questions could you ask to prompt them to be more strategic?

Lesson 20: How comfortable were the students in making choices? Were your students able to explain their thinking and convince others that their design fit the given constraints?

Utilize additional strategies for Teacher Reflection:

- Reviewing formative assessments
- Developing scaffolds
- Collaborative scoring
- PLCs
- Planning for small groups

Topic 3 (Section C) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

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| Task Title: Topic 3 - Addition of Tenths and Hundredths | Grade Level and Unit: Grade 4 Unit 3 |
| <p>Description of Task: In this activity, students use their understanding of multiplication of fractions to make an original design with sticky notes. They may choose:</p> <ul style="list-style-type: none">● the letter to make● the orientation of the letter● the orientation of the page● the arrangement of the sticky notes next to each other <p>Before making their design, students determine if their design will fit on the given paper. While not a part of the task, students can be asked to estimate how many sticky notes they need before they make a calculation.</p> <p>Alternatively, instead of asking students to choose their own letter, the class can choose a joint project, such as making the name of the school or a club. In that case, groups should each get one letter of the project to design and work together.</p> | <p>Purpose of Task: When students make decisions and choices, analyze real-world situations with mathematical ideas, translate a mathematical answer back into the context of a (real-world) situation, and adhere to constraints, they model with mathematics (MP4).</p> |
| <p>Background of Students/Learning Progression: In a previous unit, students learned to recognize and generate equivalent fractions. Earlier in this unit, they learned to add and subtract fractions with the same denominator, seeing these operations as joining and separating parts of the same whole.</p> | <p>Ensure all competencies are addressed in the task:</p> <ul style="list-style-type: none"><input type="checkbox"/> Yes, all competencies are addressed<input type="checkbox"/> No - Task needs modification |
| <p>Getting Started: Display the following expressions for students to see:</p> <p>A $1\frac{1}{2}$ B $\frac{4}{4} + \frac{2}{4}$ C $\frac{12}{8}$ D $\frac{4}{6}$</p> <p>Ask students, "Pick one that doesn't belong. Be ready to share why it doesn't belong."</p> | |

Provide 1 minute of quiet, independent think time. After 1 minute, state, “Discuss your thinking with your partner.” Give students 2-3 minutes to discuss their thinking with their partner. Afterwards, ask students to share their thinking with the whole class. Record responses as students are sharing.

Learning Cycle Model

Section C

| IM Lesson | L15: An Assortment of Fractions | L16: Tenths and Hundredths, Together | L17: Sums of Tenths and Hundredths | L18: Lots of Fractions to Add | L19: Flexible with Fractions (optional) | L20: Sticky Notes (optional) |
|-----------------------------------|---|--|---|--|---|--|
| Learning Cycle Model | Making Meaning | Making Meaning | Making Meaning | Investigation | Investigation | Create & Produce |
| Naugatuck Math Competency | 4.NS.5, 4.NS.6, 4.NS.8 | 4.NS.5, 4.NS.8 | 4.NS.8 | 4.NS.7, 4.NS.8 | 4.NS.6, 4.NS.7, 4.NS.8 | 4.NS.6, 4.NS.7 |
| Math Practice Standards | MP1, 4, 6 | - | MP7, 8 | MP1 | MP2 | MP4 |
| Lesson Purpose | The purpose of this lesson is for students to use equivalence to reason about problems that involve combining or removing fractional amounts. | The purpose of this lesson is for students to write equivalent fractions to add tenths and hundredths, up to a sum of 1. | The purpose of this lesson is for students to use equivalent fractions to add tenths and hundredths, where the sum is greater than 1. | The purpose of this lesson is for students to find the sum of three or more tenths and hundredths. | The purpose of this lesson is for students to interpret and solve problems that involve adding, subtracting, and multiplying fractions. | The purpose of this lesson is for students to apply their understanding of multiplication of a whole number by a fraction to create sticky-note letter designs. |
| Vocabulary Focus | Mixed numbers, equivalent, numerator, denominator | Tenths, hundredths, sum, equivalent, denominator | Expression, equivalent, tenth, hundredth | Expression, equivalent | Expression, value, operations, situations | Estimate, design |
| Lesson Materials/Resources | Lesson Slides Teacher Presentation Materials Student Pages | Lesson Slides Teacher Presentation Materials Student Pages | Lesson Slides Teacher Presentation Materials Student Pages <i>For Activity 1:</i> <ul style="list-style-type: none"> Create a set of cards from the blackline | Lesson Slides Teacher Presentation Materials Student Pages <i>For Activity 1:</i> <ul style="list-style-type: none"> Gather a few coins of different | Lesson Slides Teacher Presentation Materials Student Pages <i>For Activity 1:</i> <ul style="list-style-type: none"> Each group needs 12 small sticky | Lesson Slides Teacher Presentation Materials Student Pages <i>For Activity 1:</i> <ul style="list-style-type: none"> Gather rectangular sticky notes |

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| | | | <p>master (Card Sort: Less Than, Equal to, or Greater Than 1) for each group of 2-4 students</p> <ul style="list-style-type: none"> Give each group of 2-4 students a couple of sticky notes <p><i>For Activity 3:</i></p> <ul style="list-style-type: none"> Create a set of cards from the blackline master for each group of 2 (Fraction Action: Tenths, Hundredths) | <p>thicknesses for display</p> <p><i>For Activity 2:</i></p> <ul style="list-style-type: none"> Create six posters with an addition expression from the activity on each one (utilize More Than Two Fractions to make posters). | <p>notes measuring $1\frac{7}{8}$ by $1\frac{3}{8}$ inches</p> <ul style="list-style-type: none"> Give each group an inch ruler <p><i>For Activity 3:</i></p> <ul style="list-style-type: none"> Create a set of Match Cards (Find a Match) for each group of 24 students | <p>with fractional lengths. If this is not possible then cut rectangles from card stock with fractional lengths</p> <ul style="list-style-type: none"> Distribute one sticky note and paper to each student |
| | Cool-down: Which Stack is Taller? | Cool-down: Some Sums | Cool-down: Missing Fractions | Cool-down: U.S. Coins | Cool-down: Han's Design | |
| Assessment | <p>Formative Assessment Strategies: observation, questioning, student discourse - Monitoring Sheet</p> <p>See: Section C Checkpoint, Section C Checkpoint Teacher Guide End-Of-Unit Assessment, End-Of-Unit Assessment Teacher Guide</p> | | | | | |
| | | | | | | Section C Practice Problems |

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| <p>Suggested Centers</p> | <p>Jump the Line (2-5), Stage 2: Add and Subtract Tenths and Hundredths (Addressing)</p> <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> | <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> <p>Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing)</p> <p>Compare (1-5), Stage 3: Multiply within 100 (Supporting)</p> | <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> <p>Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing)</p> <p>Compare (1-5), Stage 3: Multiply within 100 (Supporting)</p> | <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> <p>Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing)</p> <p>Compare (1-5), Stage 3: Multiply within 100 (Supporting)</p> | <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> <p>Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing)</p> <p>Compare (1-5), Stage 3: Multiply within 100 (Supporting)</p> | <p>Compare (1-5), Stage 6: Add and Subtract Fractions (Addressing)</p> <p>Rolling for Fractions (3-5), Stage 2: Multiply a Fraction by a Whole Number (Addressing)</p> <p>Compare (1-5), Stage 3: Multiply within 100 (Supporting)</p> |
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Making Meaning

In Lesson 15, students encounter situations that involve combining and removing fractions with different denominators (limited to 2, 3, 4, 6, and 8), prompting them to rely on their understanding about equivalence to reason about the problems. This work prepares students to use equivalent fractions to join tenths and hundredths in upcoming lessons.

Students are not expected to reason symbolically, or to write fractional expressions with different denominators and then rewrite them with a common denominator. Instead, they reason using their intuitive understanding of equivalence, which they have begun to build since grade 3, and with the support of visual representations as needed.

Lesson 16 extends students' understanding to include fractions with denominators of 10 and 100. Students revisit how to write equivalent fractions in tenths and hundredths, and then use that understanding to add tenths and hundredths, up to a sum of 1.

In Lesson 17, they extend that work to include larger fractions and continue to build their ability to identify equivalent fractions that are helpful for finding sums.

They also encounter some equations involving unknown addends. While subtracting tenths and hundredths is not an expectation at this point, students can reason about the unknown addends by relying on their understanding of addition, their experience with decomposing a fraction into a sum, and their knowledge of equivalence.

[Lesson 15: An Assortment of Fractions](#)

- The purpose of this lesson is for students to use equivalence to reason about problems that involve combining or removing fractional amounts.
- [Teacher Presentation Materials](#)
- [Lesson 15 Slides](#)

[Lesson 16: Tenths and Hundredths, Together](#)

- The purpose of this lesson is for students to write equivalent fractions to add tenths and hundredths, up to a sum of 1.
- [Teacher Presentation Materials](#)
- [Lesson 16 Slides](#)

[Lesson 17: Sums of Tenths and Hundredths](#)

- The purpose of this lesson is for students to use equivalent fractions to add tenths and hundredths, where the sum is greater than 1.
- [Teacher Presentation Materials](#)
- [Lesson 17 Slides](#)

Investigation:

Previously, students learned to find sums of fractions with the same denominator and sums of tenths and hundredths. They added two or more tenths and hundredths, applying the commutative and associative properties along the way. Lesson 18 prompts students to apply their understanding and skills to solve problems in context, and to practice finding sums of three or more tenths and hundredths (including mixed numbers).

Lesson 19 is an optional lesson that gives students additional opportunities to integrate and apply the work from this unit to solve novel contextual problems. All three activities prompt students to make sense of and persevere in solving problems that involve adding, subtracting, and multiplying fractions. In the first two activities, students think abstractly and quantitatively to relate their calculations to a situation (MP2). The last activity encourages students to identify structure in expressions with many different operations involving fractions (MP7). Completing all three activities will take more than 60 minutes. Consider expanding the lesson across 2 days or selecting one or two activities based on students' needs or interests and time constraints.

[Lesson 18: Lots of Fractions to Add](#)

- The purpose of this lesson is for students to find the sum of three or more tenths and hundredths.
- [Teacher Presentation Materials](#)
- [Lesson 18 Slides](#)

[Lesson 19: Flexible with Fractions \(optional\)](#)

- The purpose of this lesson is for students to interpret and solve problems that involve adding, subtracting, and multiplying fractions.
- [Teacher Presentation Materials](#)
- [Lesson 19 Slides](#)

Create and Produce:

This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In previous lessons, students used diagrams, expressions, and equations to represent multiplication of a fraction by a whole number.

In this lesson, students apply their knowledge of fraction by whole number multiplication to create sticky note designs. They create a design given a set of constraints. Students describe their design to others before gaining access to the supplies to make their design.

When students make decisions and choices, analyze real-world situations with mathematical ideas, translate a mathematical answer back into the context of a (real-world) situation, and adhere to constraints, they model with mathematics (MP4).

[Lesson 20: Sticky Notes \(optional\)](#)

- The purpose of this lesson is for students to apply their understanding of multiplication of a whole number by a fraction to create sticky-note letter designs.
- [Teacher Presentation Materials](#)
- [Lesson 20 Slides](#)

Communicate and Present:

Allow students to share their designs. The teacher may wish for students to engage in a gallery walk in which they can view the groups' designs as well as provide feedback to their peers.

Once the gallery walk is complete, synthesize the learning by having a whole group discussion around the following question, ““If we arranged all your designs around the classroom, how much space would we need?””

Reflection:

“Today we made sticky-note designs.”

“What was the most challenging part of your experience today? What would you do differently to make it less challenging?”

“What was the easiest part of your experience today? How would you make it more challenging?”

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| | <p>(Optional)</p> <p>In their math journals/notebooks, have students draw each math tool they explored in this Topic and write down/paste what it is. For example, they will draw connecting cubes and then could either copy the words or cut and paste the term from a list.</p> <ul style="list-style-type: none"> ● IM Reflection Practices |
| <p>Notes: Follow all IM lessons in numerical order.</p> | <p>Complete File with Resources and Task:</p> <p>Task-Based Learning Plan Format for Gr 4 Unit 3 Topic 3</p> |