Fractions and Mixed Numbers

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

This unit develops a student's understanding of numerical operations with fractions and mixed numbers. Learners move from estimating and computing sums and differences of fractions with unlike denominators to solving complex word problems involving all four operations. Multiplication and division are explored through visual models and representations, deepening understanding of how quantities relate and interact.

Enduring Understandings

Explain that fractions are parts of a whole and express a relationship between two numbers.

Explain that fractions describe division.

Essential Questions

How does understanding the structure of the number system help you solve problems?
How does the size of a number affect the outcome of the operation?
How are fractions related to division?
How can a number line be used to compare and order fractions?
Why can't you add and subtract fractions with unlike denominators?
What makes a computational strategy both effective and efficient?
How can models help us understand the multiplication and division of fractions?
How do I use concrete materials and drawings to understand and show understanding of multiplying and dividing fractions?
How does a fraction represent division??
How can you use a model to show the fractional part of an amount
How can you use models to add and subtract fractions that have different denominators?
How can you use your knowledge of multiplication and factors to rewrite a pair of fractions so they have a common denominator?
Can you explain why the denominators are not combined?
How can you use renaming to find the difference of two mixed numbers?
What types of problems are solved with measurement?
What are tools of measurement and how are they used?
What is the purpose of standard units of measurement?
When scaling an object, what effect does the multiplier have on the product?

Learning Objectives

Estimate Sums and Differences of Fractions
Solve word problems involving addition and subtraction of fractions including those with unlike denominators referring to the same whole.

Identify and explain how to add and subtract fractions with unlike denominators.

Explain how to add and subtract mixed numbers with unlike denominators.

Explain how to add and subtract mixed numbers with regrouping.

Students will solve word problems involving fractions.

Use a presentation to multiply whole numbers by a fraction.

Multiply a whole number by a fraction.

Use a representation to multiply a fraction by a fraction.

Use an area model to represent multiplication of mixed numbers as fractions to find the product.

Explain how the size of the factors impacts the size of the product without multiplying.

Represent the quotient to a division equation as a fraction or a number.

Determine whether a quotient should be written with a remainder or as a mixed number.

Use representations to divide whole numbers by unit fractions.

Use representations to divide unit fractions by non-zero whole numbers.

Solve word problems involving the division of fractions using strategies such as the fraction models.

Standards: Content

5.OA.A	Write and interpret numerical expressions
5.OA.A.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
5.OA.A.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.
5.NF	Number and Operations — Fractions
5.NF.A	Use equivalent fractions as a strategy to add and subtract fractions
5.NF.A.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

5.NF.A.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
5.NF.B	Apply and extend previous understandings of multiplication and division to multiply and divide fractions
5.NF.B.3	Interpret a fraction as division of the numerator by the denominator (□/□ = □ ÷ □). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
5.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
5.NF.B.4.a	Interpret the product (□/□) × □ as □ parts of a partition of □ into □ equal parts; equivalently, as the result of a sequence of operations □ × □ ÷ □.
5.NF.B.4.b	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
5.NF.B.5	Interpret multiplication as scaling (resizing), by:
5.NF.B.5.a	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
5.NF.B.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
5.NF.B.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
5.NF.B.7.a	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
5.NF.B.7.b	Interpret division of a whole number by a unit fraction, and compute such quotients.
5.NF.B.7.c	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.
5.M.A	Convert like measurement units within a given measurement system
5.M.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
5.DL.A	Understand and analyze data visualizations
	Analysis of data and visualizations at this grade excludes ratio, rate, proportion and percentages. These concepts are introduced in Grade 6
5.DL.A.1	Understand how different visualizations can highlight different aspects of data. Ask questions and interpret data visualizations to describe and analyze patterns.
5.DL.A.2	Develop strategies to collect, organize and represent data of various types and from various sources. Communicate results digitally through a data visual (e.g., chart, storyboard, video presentation).
5.DL.A.3	Collect and clean data to be analyzable (e.g., make sure each entry is formatted correctly, deal with missing or incomplete data).
5.DL.A.4	Using appropriate visualizations (i.e., double line plot, double bar graph), analyze data across samples.
5.DL.B	Represent and interpret data

5.DL.B.5	Make a line plot to display a data set of measurements in fractions of a unit (½, ¼, ⅛). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

Standards: Interdisciplinary

9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.2.5.CAP.6	Compare the characteristics of a successful entrepreneur with the traits of successful employees.
9.2.5.CAP.7	Identify factors to consider before starting a business.
9.1.2.PB.1	Determine various ways to save and places in the local community that help people save and accumulate money over time.
9.1.2.PB.2	Explain why an individual would choose to save money.
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).
8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
8.2.5.ED.3	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
8.2.5.ED.5	Describe how specifications and limitations impact the engineering design process.

Assessment Evidence

Formative	Collaborative Activities, Homework, Daily Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Games, Exit Slips, Questioning, Teacher Made Pages, Learning Centers, Problem of the Day, Reveal Workbooks, Fluency Checks, Curious, Activity Based Exploration, Guided Exploration, On My Own.
Summative	Tests, Mid-Chapter Checkpoint assessments, teacher generated assessments
Alternative & Benchmark	Alternative – Reteaching, One on One Conferencing, Learning Centers, student portfolio of assignments, Homework, Higher Order Thinking Problems, Additional leveled practice, orally administered assessments. Benchmark - LinkIt Benchmark Assessments, Totowa TPA
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Reveal Math Resources, manipulatives, post-it notes, markers, number lines, chart & graph paper, construction paper, glue, scissors, paperclips, crayons, envelopes, dot ink & cards, geo blocks, number cubes/dice.

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness	X	Relationship Skills
X	Responsible Decision-Making		Social Awareness
	Self-Management		

21st Century Skills & Themes

	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting

X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		