

Advanced Math Unit 2: Operations with Fractions

Content Area: **Mathematics**
Course(s): **Mathematics 5**
Time Period: **December**
Length: **9 weeks - 45 Instructional Days**
Status: **Published**

Unit Overview

Students will develop conceptual understanding and with accuracy and efficiency solve addition and subtraction of fractions and mixed numbers. Students will also develop an understanding of the multiplication and division of fractions. This unit will be completed in 9 weeks.

Priority Standards

MATH.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MATH.5.NBT.A.4	Use place value understanding to round decimals to any place.
MATH.6.NS.B.2	With accuracy and efficiency, divide multi-digit numbers using the standard algorithm.
MATH.5.NBT.B.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MATH.6.NS.B.3	With accuracy and efficiency, add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
MATH.5.NBT.B.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
MATH.5.NF.A	Use equivalent fractions as a strategy to add and subtract fractions
MATH.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.
MATH.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.
MATH.5.NF.B	Apply and extend previous understandings of multiplication and division to multiply and divide fractions
MATH.5.NF.B.3	Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). 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.

MATH.5.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
MATH.5.NF.B.4.a	Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
MATH.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.
MATH.5.NF.B.5	Interpret multiplication as scaling (resizing), by:
MATH.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.
MATH.5.NF.B.5.b	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
MATH.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.
MATH.5.NF.B.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
MATH.5.NF.B.7.b	Interpret division of a whole number by a unit fraction, and compute such quotients.
MATH.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.

Unit Learning Goals & Targets

CCS Priority Standards

MA.5.5.NF.A Use equivalent fractions as a strategy to add and subtract fractions.

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MA.5.5.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.

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MA.5.5.NF.A.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, eg., 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.

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MA.5.5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a$ divided by b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, eg., by using visual fraction models or equations to represent the problem.

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<u>MA.5.5.NF.B.4</u> Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction.	SV mul
<u>MA.5.5.NF.4a</u> Interpret the product $(a/b) \times q$ as parts of a partition of q into b equal parts; equivalently, as a result of a sequence of operations $a \times q/b$.	SV equ
<u>MA.5.5.NF.4b</u> 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.	SV it w that
<u>MA.5.5.NF.5</u> Interpret multiplication as scaling.	SV
<u>MA.5.5.NF.5a</u> 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.	SV basi mul
<u>MA.5.5.NF.5b</u> Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	SV thar mul sma
<u>MA.5.5.NF.6</u> Solve real world problems involving multiplication of fractions and mixed numbers, eg., by using visual fraction models or equations to represent the problem.	SV and repr
<u>MA.5.5.NF.7</u> Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.	SV unit
<u>MA.5.5.NF.7a</u> Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.	SV and
<u>MA.5.5.NF.7b</u> Interpret division of a whole number by a unit fraction, and compute such quotients.	SV con
<u>MA.5.5.NF.7c</u> Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, eg., by using visual fraction models and equations to represent the problem.	SV non usir
<u>MA.6.NS.A.1</u> Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.	SV prol

MATH.6.NS.B.2 With accuracy and efficiency, divide multi-digit numbers using the standard algorithm.

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MATH.6.NS.B.3 With accuracy and efficiency, add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

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MATH.6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

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Essential Questions

Here you will use the "list" tab at the top to add all essential questions that tie to the priority standards you identified.

- How can properties help you add fraction with unlike denominators?
- How can the strategy draw a diagram help you solve fraction division problems by writing a multiplication sentence?
- How can the strategy work backward help solve a problem with fraciond that involves addition and subtraction?
- How can you add and subtract mixed numbers wit unlike denominators?
- How can you divide fractions by solving a related multiplication sentence?
- How can you find a fractional part of a group?
- How can you find the product of a fraction and a whole number without using a model?
- How can you make reasonable estimates of fraction sums and differences?
- How can you rewrite a pair of fractions so that they have a common denominator?
- How can you use a common denominator to add and subtract fractions with unlike denominators?
- How can you use a model to show the product of a fraction and a whole number?
- How can you use a unit tile to find the area of a rectangle with fractional side lengths?
- How can you use addition or subtraction to describe a pattern or create a sequence with fractions?
- How can you use an area model to show the product of two fractions?
- How can you use diagrams, equations, and story problems to represent division?
- How can you use models to add fractions that have different denominators?
- How can you use models to subtract fractions that have different denominators?
- How can you use renaming to find the difference of two mixed numbers?
- How can you use the strategy guess, check, and revise to solve problems with fractions?
- How do you calculate unit rate?

- How do you complete ratio tables?
- How do you divide a whole number by a fraction and divide a fraction by a whole number?
- How do you divide mixed numbers?
- How do you multiply fractions?
- How do you multiply mixed numbers?
- How do you write a ratio?
- How does a fraction represent division?
- How does the size of the product compare to the size of one factor when multiplying fractions greater than one?
- How does the size of the product compare to the size of one factor when multiplying fractions?

Materials and Resources

- Assessment Guide
- GoMath Performance Tasks
- LinkIt! Standards Assessments
- Renlearning Performance Tasks
- Think Central Access

Unit Assessments (Required)

- Big Ideas Grade 5 and 6 Assessments
- I Ready

Learning Plan and Pacing Guide

Time Frame	Lesson	Standard(s)	Target
Chapter 6 13 days	Chapter 6 Opener: Divide Whole Numbers	Performance Task Preview & Vocabulary	
	Lesson 6.1: Relate Multiplication and Division	5.NBT.B.6	Use multiplication to divid
	Lesson 6.2: Division Patterns	5.NBT.B.6	Use place value and divisio
	Lesson 6.3: Estimate Quotients	5.NBT.B.6	Use division facts and com
	Lesson 6.4: Divide by One-Digit Numbers	5.NBT.B.6	Divide multi-digit numbers:

Lesson 6.5: Use Partial Quotients to Divide by Two-Digit Numbers	5.NBT.B.6	Use an area model and par
Lesson 6.6: Use Partial Quotients with a Remainder	5.NBT.B.6	Use partial quotients to div
End of Chapter 6: Divide Whole Numbers	Day 2 Centers	
End of Chapter 6: Divide Whole Numbers	Day 3 Chapter Assessment	

With accuracy and efficiency, div algorithm.

Gr 6 Ch 2 lesson 2.6

MATH.6.NS.B.2

Chapter 7
12 days

Chapter 7 Opener: Divide Decimals	Performance Task Preview & Vocabulary	
Lesson 7.1: Division Patterns with Decimals	5.NBT.A.2 5.NBT.B.7	Find quotients involving d
Lesson 7.2: Estimate Decimal Quotients	5.NBT.A.4 5.NBT.B.7	Use compatible numbers to decimals.
Lesson 7.3: Use Models to Divide Decimals by Whole Numbers	5.NBT.B.7	Use models to divide decir
Lesson 7.4: Divide Decimals by One-Digit Numbers	5.NBT.B.7	Divide decimals by one-di
Lesson 7.5: Divide Decimals by Two-Digit Numbers	5.NBT.B.7	Divide decimals by two-di
Lesson 7.6: Use Models to Divide Decimals	5.NBT.B.7	Use models to divide decir
Lesson 7.7: Divide Decimals	5.NBT.B.7	Divide decimals by decima
Lesson 7.8: Insert Zeros in the Dividend	5.NBT.B.7	Insert zeros in the dividenc whole numbers.

Lesson 7.9: Problem Solving: Decimal Operations	5.NBT.B.7	Solve word problems invol
End of Chapter 7: Divide Decimals	Day 1 Performance Task & Centers	
End of Chapter 7: Divide Decimals	Day 2 Chapter Assessment	
Gr. 6 ch 2 lesson 2.7	MATH.6.NS.B.3	With accuracy and efficiency, ad decimals using the standard alge

Chapter 8
12 days

Chapter 8 Opener: Add and Subtract Fractions	Performance Task Preview & Vocabulary	
Lesson 8.1: Simplest Form	5.NF.A.1	Write fractions in simplest
Lesson 8.2: Estimate Sums and Differences of Fractions	5.NF.A.1 5.NF.A.2	Estimate sums and differer
Lesson 8.3: Find Common Denominators	5.NF.A.1	Write fractions using a con
Lesson 8.4: Add Fractions with Unlike Denominators	5.NF.A.1 5.NF.A.2	Add fractions with unlike c
Lesson 8.5: Subtract Fractions with Unlike Denominators	5.NF.A.1 5.NF.A.2	Subtract fractions with unl
Lesson 8.6: Add Mixed Numbers	5.NF.A.1 5.NF.A.2	Add mixed numbers with u
Lesson 8.7: Subtract Mixed Numbers	5.NF.A.1 5.NF.A.2	Subtract mixed numbers w
Lesson 8.8: Problem Solving: Fractions	5.NF.A.1 5.NF.A.2	Solve multi-step word probl numbers.
End of Chapter 8: Add and Subtract Fractions	Day 1 Performance Task	
End of Chapter 8: Add and Subtract Fractions	Day 2 Centers	
End of Chapter 8: Add and Subtract Fractions	Day 3 Chapter Assessment	

Chapter 9
11 days

Chapter 9 Opener: Multiply Fractions	Performance Task Preview & Vocabulary	
Lesson 9.1: Multiply Whole Numbers by Fractions	5.NF.B.4a 5.NF.B.6	Multiply whole numbers b

Lesson 9.2: Use Models to Multiply Fractions by Whole Numbers	5.NF.B.4a 5.NF.B.6	Multiply fractions by whole numbers.
Lesson 9.3: Multiply Fractions and Whole Numbers	5.NF.B.4a 5.NF.B.6	Multiply fractions and whole numbers.
Lesson 9.4: Use Models to Multiply Fractions	5.NF.B.4a 5.NF.B.6	Use models to multiply a fraction by a whole number.
Lesson 9.5: Multiply Fractions	5.NF.B.4a 5.NF.B.6	Multiply a fraction by a fraction.
Lesson 9.6: Find Areas of Rectangles	5.NF.B.4b 5.NF.B.6	Find areas of rectangles.
Lesson 9.7: Multiply Mixed Numbers	5.NF.B.6	Multiply a mixed number by a whole number.
Lesson 9.8: Compare Factors and Products	5.NF.B.5a 5.NF.B.5b	Compare a product to each factor.
End of Chapter 9: Multiply Fractions	Day 1 Performance Task & Centers	
End of Chapter 9: Multiply Fractions	Day 2 Chapter Assessment	
gr 6 ch 2 lesson 2.1		
Lesson 10.1: Interpret Fractions as Division	5.NF.B.3	Understand how fractions represent division.
Lesson 10.2: Mixed Numbers as Quotients	5.NF.B.3	Understand how mixed numbers represent division.
Lesson 10.3: Divide Whole Numbers by Unit Fractions	5.NF.B.7b 5.NF.B.7c	Divide whole numbers by unit fractions.
Gr 6 Ch 2 lesson 2.2	MATH.6.NS.A.1	Divide fractions.
Lesson 10.4: Divide Unit Fractions by Whole Numbers	5.NF.B.7a 5.NF.B.7c	Divide unit fractions by whole numbers.
Lesson 10.5: Problem Solving: Fraction Division	5.NF.B.7c	Solve multi-step word problems involving division of whole numbers leading to fractions.
End of Chapter 10: Divide Fractions	Day 1 Performance Task & Centers	
End of Chapter 10: Divide Fractions	Day 2 Chapter Assessment	

Chapter 10

7 days

Strategies for Multilingual learners

For Spanish speaking, students can use the EdConnect Spanish book. Others need one on one support, vocabulary flashcards, elimination of word problems, picture clues, Google Translate, peer buddy ELL

- Big Ideas Spanish textbook
- Multilingual Dictionary
- Spanish letters

Strategies for Enrichment

- Big Ideas Enrichment & Extension Pages
- Desmos
- Iready Pathway
- Kahn Academy

Strategies for Students in Need of Intervention

When students struggle with facts: Reflex Math, multiplication chart, flashcards, timed tests ACES/Struggling

When students struggle with word problems: highlight clue words, underline the question, break down steps, read aloud, review vocabulary ACES/Struggling

- Constant progress monitoring and use of data driven instruction
- Flexible grouping
- Highlight key words in word problems
- Incorporate centers that focus on mastery of skills for struggling students
- Incorporate centers that focus on skills that need enrichment
- One on one conferencing
- Performance assessments
- Prodigy Math
- Provide manipulatives and visual aids
- Provide opportunities for higher level activities to be completed
- Provide opportunities for independent projects
- Provide written notes/directions
- Tiered activities/lessons
- Use of calculator
- Use of graph paper

Technology Integration

Math Playground	http://www.mathplayground.com/grade_5_games.html
Khan Academy	http://www.khanacademy.com/math/cc-fifth-grade-math
Illustrative Mathematics	http://www.illustrativemathematics.org
Prodigy	http://www.prodigygame.com
Learn Zillion	http://www.learnzillion.com
aaamath	http://www.aaamath.com/grade5.html
Math is Fun	https://www.mathsisfun.com/
Sheppard Software	http://www.sheppardsoftware.com/math.htm
Adapted Mind	http://adaptedmind.com
Internet 4 Classrooms	http://internet4classrooms.com
Academic Skill Builders	http://arcademicskillbuilders.com
Math Play	http://www.math-play.com
Class K-12	https://www.classk12.com
Greg Tang Math	https://grextangmath.com
Figure This	figurethis.nctm.org/challenges/math_index.htm
Woot Math	https://ed.wootmath.com/adaptive-learning
Freckle Education	https://www.freckle.com

- 8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
- 8.1.5.A.3 Use a graphic organizer to organize information about problem or issue.
- 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
- 8.1.5.A.5 Create and use a database to answer basic questions.
- 8.1.5.A.6 Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis to the data.

21st Century Life & Career Ready Practices

- CRP11. Use technology to enhance productivity.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Interdisciplinary Connections

- • Next Gen Science Standards (5. Structure and Properties of Matter Unit have connections to 5.NBT.A.1; 5.NF.B.7; 5.MD.A.1; 5.MD.C.3; 5.MD.C.4)
- • Reading Connection: RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.