

# 07. Multiplication of Mixed Numbers; Geometry; Graphs

Content Area: **Math**  
Course(s):  
Time Period: **Full Year**  
Length: **5 weeks**  
Status: **Published**

## **General Overview, Course Description or Course Philosophy**

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In Grade 5, instructional time should focus on three critical areas:

1. Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)
2. Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations
3. Developing understanding of volume

In this unit, students will understand strategies for multiplying fractions are extended to multiply mixed numbers, use attributes of two-dimensional figures to classify shapes in a hierarchy based on these properties, and that coordinate grids are used to graph points, visualize numerical patterns, and represent real-world problems.

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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Students will understand that:

- Strategies for multiplying fractions are extended to multiply mixed numbers.
- Attributes of two-dimensional figures are defining characteristics and are used to classify shapes in a hierarchy based on these properties.
- Coordinate grids are used to graph points, visualize numerical patterns, and represent real-world problems.

Essential Questions:

- How are strategies for multiplying fractions extended to effectively multiply mixed numbers? What adjustments or adaptations are necessary in this process?
- What defining attributes characterize two-dimensional figures, and how are these attributes used to classify shapes in a hierarchy?
- How do different shapes relate based on their defining properties?
- How are coordinate grids employed to graph points, visualize numerical patterns, and represent real-world problems? How do coordinates aid in problem-solving and visualizing data?
- In what real-life scenarios are strategies for multiplying mixed numbers crucial? How do these strategies apply to practical situations involving quantities or measurements?

- How do coordinate grids facilitate problem-solving in diverse fields such as navigation, mapping, or scientific analysis? What advantages do coordinates offer in representing and interpreting data?
- How do visual representations on coordinate grids aid in understanding numerical patterns or relationships? How can these visual models support problem-solving?
- How are attributes of two-dimensional figures applicable in real-world contexts?
- How can coordinates be used to represent mathematical relationships or situations in different contexts, such as science experiments, sports analytics, or city planning?

## **STUDENT LEARNING TARGETS**

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Refer to the 'Declarative Knowledge' and 'Procedural Knowledge' sections.

### **Declarative Knowledge**

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Students will know:

- By thinking of a mixed number as the sum of a whole number and fraction, the distributive property can be applied to make problems easier when multiplying.
- There are advantages and disadvantages to each multiplication strategy.
- Multiplying side lengths and tiling rectangles with squares of unit-fraction side lengths results in the same area measurement.
- Once a common denominator is found between two fractions, the quotient of the fractions is the quotient of the numerators; with this approach, denominators behave like units of measure.
- A hierarchy is a system of classification that names categories and shows the relationships between categories and subcategories; the objects in a subcategory have all of the attributes of the objects in the categories above it, as well as at least one additional attribute.
- Corresponding terms are the terms that appear in the same position in each given sequence.
- Rule, table, and graph representations of corresponding terms illuminate different aspects of a relationship.

### **Procedural Knowledge**

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Students will be able to:

- Use area models and partial products to multiply mixed numbers

- Multiply mixed numbers by renaming factors as fractions and using a fraction multiplication algorithm
- Multiply mixed numbers to find the areas of rectangles with fractional side lengths; confirm areas by tiling with squares of unit fraction side lengths
- Solve fraction division problems by renaming dividends and divisors with a common denominator
- Classify triangles and quadrilaterals in a hierarchy based on properties; name polygons
- Analyze and discuss varied hierarchies and revise knowledge
- Use rules to generate sequences; identify relationships between corresponding terms; graph points on a coordinate grid to visualize patterns and relationships
- Use rules, tables, and graphs to compare real-world relationships and solve problems.
- Identify relationships between patterns; graph ordered pairs from corresponding terms of patterns; use the graph to analyze real-world phenomena.

## **CONTENT AREA STANDARDS**

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### **5.OA**

**A. Write and interpret numerical expressions**

**B. Analyze patterns and relationships**

### **5.NBT**

**A. Understand the place value system**

**B. Perform operations with multi-digit whole numbers & with decimals to hundredths**

### **5.NF**

**A. Use equivalent fractions as a strategy to add and subtract fractions**

**B. Apply and extend previous understandings of multiplication and division to multiply and divide fractions**

MA.5.OA.B.3

Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.

MA.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.
MA.5.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
MA.5.NF.B.4b	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.
MA.5.NF.B.7a	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
MA.5.NF.B.7b	Interpret division of a whole number by a unit fraction, and compute such quotients.
MA.5.NF.B.7c	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.
MA.5.MD.B.2	Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots.
MA.5.G.A.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., $x$ -axis and $x$ -coordinate, $y$ -axis and $y$ -coordinate).
MA.5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MA.5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
MA.5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.

## **INTERDISCIPLINARY CONNECTIONS**

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### Geography and Coordinate Mapping

- Explore geographical maps, marking specific points on a coordinate grid to identify locations or create treasure hunt activities using coordinates for navigation.

## **RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)**

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CS.K-12.2.d	Evaluate and select technological tools that can be used to collaborate on a project.
CS.K-12.7.a	Select, organize, and interpret large data sets from multiple sources to support a claim.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
TECH.K-12.P.4	Demonstrate creativity and innovation.
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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### Core Instructional Materials:

- Everyday Math Unit 7 Resources (Math Masters, Student Journal Volume 2) / [ConnectED](#)
- Calendar Math

### Supplemental Materials

- Illustrative Math Tasks
- IXL
- Games
  - Spoon Scramble (Lessons 7-2, 7-12): Multiplying fractions and multiplying and dividing by powers of 10
  - Exponent Ball (Lesson 7-3): Multiplying and dividing decimals by powers of 10
  - Doggone Decimal (Lesson 7-4): Estimating decimal products
  - Fraction Top-It: Addition (Lesson 7-5): Adding fractions
  - What's My Attribute Rule? (Lesson 7-5): Classifying Shapes
  - Property Pandemonium (Lesson 7-7, 7-9): Naming and classifying quadrilaterals
  - Decimal Domination (Lesson 7-13): Multiplying decimals
- Manipulatives
  - Number card sets 1-4, 1-8, 0-9, 1-10, 2-10
  - 6-sided dice
  - Fraction circles
  - Counters
  - Rulers
  - Tape measure
  - Meterstick
  - Stopwatch

### Intervention Materials:

- Number Worlds
- Touch Math Now

## **EVIDENCE OF LEARNING**

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Refer to the 'Formative, Summative, and Benchmark Assessments' sections.

## **Alternate Assessments**

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- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

## **Formative Assessments**

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- Journal Pages
- Homelinks
- Math Boxes
- Observations
- Classwork
- Homework Assignments
- Do Now Questions
- Exit Tickets
- Self Assessment Questions

## **Summative Assessments**

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- Check Points
- Unit 7 Assessment
- Graded Assignments
- Project-based assessments

## **Benchmark Assessments**

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- IXL Screener / Diagnostic Snapshot BOY
- Trimester 1 Benchmark Assessment
- IXL Diagnostic Snapshot MOY
- Trimester 2 Benchmark Assessment
- IXL Diagnostic Snapshot EOY

- Trimester 3 Benchmark Assessment

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.