

## Unit 5: Multiplying and Dividing Fractions

### 5<sup>th</sup> Grade Math

26 Class Meetings

*Written March 2026*

#### Essential Questions

- How do fractions help us represent, compare, and solve problems involving real-world quantities and equal sharing?
- How do multiplication and division with fractions change the size of a quantity, and how can models help us understand why?
- How can mathematical models, expressions, and data representations help us explain and justify solutions to real-world problems?

#### Enduring Understandings with Unit Goals

**EU 1:** Fractions are numbers that represent quantities, division, and relationships between parts and wholes.

- Interpret fractions as division and represent equal sharing situations.
- Add and subtract fractions and mixed numbers using equivalent fractions.
- Write, interpret, and evaluate numerical expressions involving fractions.
- Use visual models, equations, and reasoning to explain fraction relationships and solutions.

**EU 2:** Operations with fractions extend understanding of multiplication and division.

- Apply properties of operations to multiply and divide fractions and mixed numbers.
- Interpret multiplication of fractions as groups, area, and scaling (resizing quantities).
- Understand how multiplying or dividing by fractions affects the size of a quantity.
- Solve real-world problems involving multiplication and division of fractions using models and equations.

**EU 3:** Mathematical models and data representations help analyze and solve problems involving fractions.

- Represent fractional measurements using line plots.
- Use operations with fractions to interpret and solve problems based on data.
- Estimate and assess the reasonableness of solutions using benchmark fractions and number sense.
- Communicate mathematical thinking clearly using models, precise vocabulary, and mathematical reasoning.

#### Standards

##### Common Core State Standards:

- **CCSS.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.
- **CCSS.5.NF.B.3**- Interpret a fraction as division of the numerator by the denominator ( $\frac{a}{b} = a \div b$ ). 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.

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- **CCSS. 5.NF.B.4**-Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- **CCSS. 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  $a \times q \div b$ .
- **CCSS. 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.
- **CCSS. 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.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.
- **CCSS. 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.
- **CCSS. 5.NF.B.7**-Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
  - **CCSS. 5.NF.B.7.A**- Interpret division of a unit fraction by a non-zero whole number and compute such quotients.
  - **CCSS.5.NF.B.7.B**- Interpret division of a whole number by a unit fraction and compute such quotients.
  - **CCSS.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.
- **CCSS. 5.OA.A.1**-Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- **CCSS.5.OA.A.2**-Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
- **CCSS. 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.
- **CCSS.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.

### ISAAC Vision of the Graduate Competencies

**Competency 1:** Write effectively for a variety of purposes.

**Competency 2:** Speak to diverse audiences in an accountable manner.

**Competency 3:** Develop the behaviors needed to interact and contribute with others on a team.

**Competency 4:** Analyze and solve problems independently and collaboratively.

**Competency 5:** Be responsible, creative, and empathetic members of the community.

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#### Unit Content Overview

- **Fractions as Numbers and Division**
  - Review fractions as quantities representing parts of a whole and parts of a set using visual models.
  - Interpret fractions as division ( $a/b = a \div b$ ).
  - Represent equal sharing situations that result in fractional or mixed number answers.
  - Generate equivalent fractions to create common denominators.
  - Add and subtract fractions and mixed numbers with unlike denominators.
  - Write, interpret, and evaluate numerical expressions involving fractions using parentheses and grouping symbols.
  - Solve real-world problems involving fraction addition, subtraction, and division.
  - Use benchmark fractions and estimation to assess the reasonableness of solutions.
- **Multiplication and Division with Fractions**
  - Interpret multiplication of fractions as equal groups, parts of a partitioned whole, and scaling.
  - Multiply whole numbers and fractions using visual models such as number lines, tape diagrams, and area models.
  - Find the area of rectangles with fractional side lengths using tiling and multiplication.
  - Multiply fractions and mixed numbers using efficient strategies and equations.
  - Interpret division of unit fractions by whole numbers and whole numbers by unit fractions.
  - Model fraction division using drawings, equations, and real-world contexts.
  - Analyze how multiplying or dividing by fractions changes the size of a quantity.
  - Solve real-world problems involving multiplication and division of fractions and mixed numbers.
- **Representing and Analyzing Data with Fractions**
  - Collect and represent measurement data using fractional units.
  - Create line plots displaying data in fractions such as  $1/2$ ,  $1/4$ , and  $1/8$ .
  - Interpret information presented in line plots.
  - Use fraction operations to solve problems involving measurement data.
  - Compare data sets and describe patterns shown in graphical representations.
  - Explain solutions and conclusions using mathematical reasoning, models, and precise vocabulary.

**Vocabulary and Key Terms:** fraction, numerator, denominator, equal shares, division, dividend, divisor, quotient, unit fraction, non-unit fraction, equivalent fractions, simplify, multiply, product, repeated addition, scaling, factor, multiple, mixed number, improper fraction, tape diagram, number line, area model, partition, subdivide, fraction model, fraction multiplication, fraction division, reciprocal reasoning, groups, parts of a whole, estimation, benchmark fractions, real-world problem, mathematical expression, equation, strategy, representation, visual model, reasoning, justification, data, measurement, line plot, dot plot, frequency, distribution, compare data, interpret data, mathematical explanation

#### Interdisciplinary Connection:

- ELA

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#### Daily Learning Objectives with TWPS

##### Students will be able to...

- Relate equal shares of objects to division expressions and visual representations of fractions.
  - *How does sharing objects equally help you understand why division and fractions represent the same idea?*
- Write division expressions that represent fractions and vice versa.
  - *How can you prove that a fraction like  $\frac{3}{4}$  can also be written as a division problem?*
- Solve division problems when the quotient is a fraction or mixed number, including cases with larger values.
  - *What strategies help you make sense of a division problem when the answer is less than one or a mixed number?*
- Generate equivalent fractions by multiplying the numerator and denominator by the same number.
  - *Why does multiplying the numerator and denominator by the same number keep the fraction's value the same?*
- Multiply a unit fraction by a whole number.
  - *What does it mean when you multiply several copies of a unit fraction together?*
- Multiply a non-unit fraction by a whole number.
  - *How is multiplying  $3 \times \frac{2}{5}$  like repeated addition? How is it different?*
- Relate multiplication of a fraction by a whole number to multiplication of a whole number by a fraction and use this to develop a general method to multiply any fraction by any whole number (or vice versa).
  - *Why do you think  $4 \times \frac{3}{5}$  gives the same result as  $\frac{3}{5} \times 4$ ?*
- Solve real-world problems involving multiplication of fractions and whole numbers and create real-world contexts for expressions involving multiplication of fractions and whole numbers.
  - *What clues in a real-world problem tell you that you should multiply a fraction by a whole number?*
- Multiply a fraction by a fraction without subdivisions using tape diagrams and number lines.
  - *How does a tape diagram or number line help show what part of a part means?*
- Multiply a fraction by a fraction with subdivisions using tape diagrams and number lines.
  - *Why do we sometimes need to subdivide sections when multiplying fractions?*
- Multiply a fraction by a fraction with more complicated subdivisions using an area model.
  - *How does an area model help you visualize fraction multiplication more clearly than numbers alone?*
- Solve real-world problems involving multiplication of fractions with fractions and create real-world contexts for expressions involving multiplication of fractions with fractions.
  - *Can you describe a real-life situation where finding a fraction of another fraction would make sense?*
- Multiply mixed numbers by whole numbers.
  - *What strategies help you decide whether to keep a mixed number or convert it before multiplying?*
- Multiply mixed numbers by fractions.
  - *Why might converting mixed numbers to improper fractions make multiplication easier?*
- Multiply mixed numbers by mixed numbers.
  - *What steps help you stay organized when multiplying two mixed numbers?*
- Develop a general method to multiply with mixed numbers.

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- *What rule or process works every time when multiplying mixed numbers? Why does it work?*
- Solve real-world problems involving multiplication with mixed numbers and create real-world contexts for expressions involving multiplication with mixed numbers.
  - *How can estimating help you check if your mixed-number answer makes sense in a real-world situation?*
- Interpret multiplication as scaling.
  - *How does multiplying by a fraction change the size of a number compared to multiplying by a whole number?*
- Divide a unit fraction by a whole number.
  - *What happens to the size of a fraction when it is divided into more equal parts?*
- Divide a whole number by a unit fraction.
  - *Why does dividing by a fraction sometimes make the answer larger?*
- Solve real-world problems involving division with fractions and create real-world contexts for expressions involving division with fractions.
  - *How can drawing a model help explain a fraction division situation?*
- Solve real-world problems involving multiplication and division with fractions.
  - *How do you decide whether a situation requires multiplication or division with fractions?*
- Create line plots.
  - *Why does a line plot a useful way to organize measurement data?*
- Solve problems involving information presented in a line plot (dot plot).
  - *How can the distribution of dots on a line plot help you answer questions about the data?*

**Instructional Strategies/Differentiated Instruction**

- Whole group instruction
- Teacher modeling
- Think-write-pair-share and small-group discussions
- Graphic organizers
- Manipulatives
- Number lines
- Accountable talk
- Homework
- Word walls with visuals
- Small group instruction
- Exemplars

**EL Differentiation Strategies**

- Word Banks and Word Walls with visuals
- Culturally responsive teaching
- Explicit teacher modeling
- Key vocabulary
- Graphic organizers
- Strategic Grouping
- Non-verbal assessments

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#### Assessments

##### **FORMATIVE ASSESSMENTS:**

- Do Now
- Academic Discourse
- Exit Slips
- Accountable Talk Discussions
- Completed notes
- Homework
- Performance Task -- “School Carnival” Performance Task
  - Teacher’s rubric/scoring guide

##### **SUMMATIVE ASSESSMENTS:**

- Quiz: Fractions as Numbers and Division, Multiplication and Division with Fractions (EU1, EU2)
- IAB
- Unit Task: “Talent Show Night” Performance Task (EU1, EU2 and EU3)

#### Unit Task

**Unit Task Name:** “Talent Show Night” Performance Task

**Description:** Upon completion of the unit students apply their understanding of fraction operations and numerical reasoning to plan and organize a school talent show. Through a series of real-world problem-solving situations, students demonstrate their ability to interpret fractions as division, multiply and divide fractions and mixed numbers, analyze how multiplication acts as scaling, and represent data involving fractional measurements. Students solve multi-step problems related to scheduling performances, determining stage space, calculating equipment usage, and analyzing rehearsal time data.

**Evaluation:** Teacher’s Scoring Guide

#### Unit Resources

- Google Classroom
- Pear Assessment
- Math In Focus
- Math Antics
- State Common Core Standards Transition Tasks
- Match Fishtank
- Worksheets
- Individual White boards
- Interactive notebook
- Laptops
- SBAC Prep Online