Mathematics: Grade 5

Overview

Grade three students add and subtract multi-digit whole numbers fluently and apply this understanding to solve real-world problems.[3.CA.1-2] Grade four students solve real-world problems involving addition and subtraction of fractions and mixed numbers with common denominators.[4.CA.7-8] Students in grade five extend this prior learning to solve real-world problems involving addition and subtraction of fractions with unlike denominators.[5.CA.3-4]

In grade three, students model the concepts of multiplication and division,[3.CA.3-4] and in grade four, they multiply and divide multi-digit whole numbers with some limitations and solve problems involving multiplicative comparison.[4.CA.1,2,5] By grade five, students are expected to divide four-digit numbers by two-digit numbers and solve real-world problems involving multiplication and division of whole numbers in general.[5.CA.1-2] They also multiply and divide fractions by fractions, solve real-world problems involving multiplication and division of fractions and mixed numbers,[5.CA.5-8] and use all four operations with decimals to the hundredths place.[5.CA.9]

Number line reasoning is extended in the grade five standards for *Computation and Algebraic Thinking* as students learn to plot points and solve problems using a coordinate plane.[5.CA.11] These ideas are further developed in grade six as students extend the axes to include negative numbers and begin graphing in all four quadrants.[6.AF.5]

An understanding of the standards in the *Computation and Algebraic Thinking* domain represents the meeting of multiple progressions of learning, including fluencies with rational numbers, a developed understanding of all four arithmetic operations, and the practice of graphing ordered points on the coordinate plane. All of these important topics are essential for success in the algebraic learning of middle school and high school.

Computation and Algebraic Thinking	
Learning Outcome	Students apply concepts and strategies of multiplication and division to solve real-world problems. Students add and subtract unlike fractions and use visual fraction models to multiply and divide fractions and whole numbers. Students apply conceptual models and strategies to all operations with decimals to solve real-world problems and represent real-world situations within the first quadrant of the coordinate plane.
Standard	**5.CA.6:** Use visual fraction models and numbers to divide a fraction by a fraction or a whole number. (E)
Evidence Statements	**Academic Vocabulary**

- Use visual fraction models to solve expressions involving the division of unit fractions and non-unit fractions.
- Use visual fraction models to solve expressions involving the division of unit fractions and whole numbers.
- Use visual fraction models to solve expressions involving the division of non-unit fractions and whole numbers.
- Use visual fraction models to solve expressions involving the division of and division by mixed numbers, including improper fractions.

- Division (Divide)
- Unit fraction
- Non-unit fraction
- Whole number
- Mixed number
- Improper fraction
- Partition
- Area model
- Number line
- Tape diagram

Clarification Statements	Common Misconceptions
- This standard is students' first formal introduction to dividing fractions and whole numbers. Students are expected to divide unit fractions, non-unit fractions, and whole numbers using visual fraction models. - The intention of this standard is for students to build conceptual understanding of dividing fractions. Use of the algorithm is not appropriate for this standard. - Dividing fractions also includes the dividing of and dividing by mixed numbers, including improper fractions. - There are four problem types for division of fractions: - Whole number divided by a whole number; - Fraction (unit- or non-unit) divided by a whole number; - Whole number divided by a fraction (unit- or non-unit); and - Fraction (unit- or non-unit) divided by a fraction (unit-or non-unit). - Whole number divided by whole number division is based on partitive, or sharing, division. - If six friends share seven sandwiches, how much will each friend receive? (7 ÷ 6 = 7/6 or 1 1/6. One way to solve this problem is to give one sandwich to each friend and then cut the last sandwich into sixths, giving each friend 1/6, resulting in a total of 1 1/6. Another way would be to cut each sandwich into six pieces and	- Students may believe the solution should always be less than the divisor and dividend. - Students may not connect a model with the correct answer (e.g., the model may show the solution to be 7, however students believe the solution to be ⅞). - Students may have difficulty identifying a correct expression from a real-world problem.

- distribute 1/6 of each sandwich to each friend, resulting in a total of 7/6. Students should draw the six sandwiches and show how they distributed them to support their method of solving. Presenting this type of problem in a real-life context will assist students in developing their understanding.
- When dividing a fraction by a whole number, teachers may want to begin with unit fractions to help students make sense of this problem type, then move to non-unit fractions. This type of problem is also based on partitive, or sharing, division. In this case, a fractional amount is being divided into equal parts. For example, 2/3 ÷ 3 means 2/3 is being divided into three equal parts. The use of area models, number lines, and tape diagrams will help students visualize and model this type of problem. Presenting this type of problem in a real-life context will assist students in developing their understanding.
- Dividing a whole number by a fractions lends itself more toward measurement or repeated subtraction. Again, teachers are encouraged to begin with unit fractions, then incorporate non-unit fractions. The expression 6 ÷ 3/4 asks students how many 3/4s are in six wholes. Using a number line or a tape diagram to model six wholes, then identifying 3/4 of each will help students visualize this concept. Presenting this type of problem in a real-life context will assist students in developing their understanding.
- Dividing fractions by fractions asks students to identify how many sets of a given fraction make up a larger fraction. For example, 5/3 ÷ 1/2 asks students how many sets of 1/2 make up 5/3. By using area models, number lines, and tape diagrams, students should model 5/3 then divide it into sets of 1/2. Presenting this type of problem in a real-life context will assist students in developing their understanding.
- Teachers should avoid teaching tricks like "keep-change-flip," which do not support sense-making.
- Grade five Integrated STEM standards 5.AM.1 and 5.AM.2 integrate well with this standard. Additionally, this standard should be integrated with the correlating problem solving standard

5.CA.8.	

Looking Back	Looking Ahead
This concept is not specifically addressed in the Indiana Academic Standards prior to this grade level.	**6.NS.4:** Solve real-world problems with positive fractions and decimals by using one or two operations. (E)

Instructional Resources

- [Mathematics Grades 3-5 Vertical Articulation Guide](#)
- [Mathematics Grades 5-6 Vertical Articulation Guide](#)
- [Learning Progressions & Content Supports: Grade 3 through Grade 5](#)
- [Implementing the Mathematics Process Standards: Grades Three through Five](#)
- [Illustrative Mathematics-Dividing by One-Half](#)
- [Illustrative Mathematics-How Many Servings of Oatmeal?](#)
- [Illustrative Mathematics-Painting a Room](#)
- [Illustrative Mathematics-Salad Dressing](#)
- [Illustrative Mathematics-How Many…Are In…?](#)
- [Illustrative Mathematics-Dan's Division Strategy](#)
- [Inside Mathematics-Grades 3-5th: Dividing Fractions Pattern Blocks Video](#)
- [Tools for Teachers-The Division Race](#) [(Login Instructions)](#)
- [Partnership for Inquiry Learning-Multiplying and Dividing Fluently: Dividing Fractions](#)
- [Make Math Moments-Salting the Driveway 3 Act Math Task](#)
- [Modeling Fractions Divided by Fractions Video](#)
- [Dividing Fractions by Whole Numbers Using Models Video](#)
- [Dividing Whole Numbers by Fractions Using Models Video](#)
- [Open Up Resources-Fraction Division: Lessons 10-16](#)
- [Mathematics Assessment Project-Interpreting Multiplication and Division](#)
- [Desmos-Flour Planner](#)
- [Desmos-Fill the Gap](#)
- [Polypad/Amplify-Interactive Fraction Models Tutorials](#)

Universal Supports for All Learners

- [2024 Content Connectors](#)
- [Universal Design for Learning Playbook](#)
- [UDL Guideline Infographic, from Learning Designed](#)
- [UDL Tips from CAST](#)
- [Mathematics Learning Recovery Series: Part 2-Addressing the Gaps in Student Learning](#)
- [Mathematics Learning Recovery Series: Part 3-Instructional Strategies for All Learners](#)

Instructional Strategies
- [What Works Clearinghouse-Concrete-Semi-Concrete-Abstract Video](#) [(Print Recommendations)](#)
- [What Works Clearinghouse-Clear & Concise Mathematical Language Video](#) ([Print](#)

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Recommendations)
- [NYSED-Frayer Vocabulary Model Scaffolding Example & Template](#)
- [Magma Math: Math Teaching Practices](#)
- [Problem Solving Instructional Support](#)
- [WIDA-Doing and Talking Mathematics: A Teachers Guide to Meaning-Making with English Learners](#)
- [Virginia Department of Education Students with Disabilities in Mathematics Frequently Asked Questions](#)

Assessment Considerations

- [ILEARN Test Blueprint: Mathematics 2025-2026 (Spreadsheet)](#)
- [ILEARN Test Blueprint: Mathematics 2025-2026 (PDF)](#)
- [IDOE Released Items Repository](#)
- [I AM - Indiana's Alternate Measure](#)
- [Quality Mathematic Items for Classroom Assessments (Featuring New ILEARN Item Specifications)](#)
- [UDL Assessment Strategies](#)

Interdisciplinary Connections
Coming Soon

Disciplinary Literacy
Coming Soon

Contact IDOE's [Office of Teaching and Learning](#) with any questions.