



INDIANA ACADEMIC STANDARDS FRAMEWORKS

Mathematics: Grade 6

Overview

In grade four, students express whole numbers as fractions and relate mixed numbers and improper fractions to objects and pictures.^{4.NS.2} Grade five students understand fractions using part and whole reasoning and as division operations, and they model with percents.^{5.NS.2,4} They also use whole numbers, fractions, and decimals to represent quantities with and without context and use number lines to compare, order, and represent those quantities.^{5.NS.1}

In grade six students begin to apply negative integers within real-world contexts^{6.NS.1} and use number lines to model opposite signed numbers as located on opposite sides of zero.^{6.NS.2} Students also compare and order rational numbers using number lines^{6.NS.3} and solve real-world problems with positive fractions and decimals.^{6.NS.4}

By grade seven, students understand subtracting rational numbers as adding the additive inverse (and vice versa)^{7.NS.1} and they use properties of operations to understand the rule for multiplying and dividing integers. Students begin to differentiate between rational and irrational numbers, and in grade eight they express their decimal equivalents and compare them using number lines.^{8.NS.1-2}

Students in grade six use the order of operations to evaluate numerical expressions^{6.NS.5} and they use properties of operations to create and identify equivalent linear expressions.^{6.NS.7} These concepts, along with the use of whole number exponents,^{6.NS.8} are essential understandings for student success with algebra and functions in grades seven and eight.

Number Sense

Learning Outcome

Students begin to apply negative integers within real-world contexts and use number lines to model opposite signed numbers as located on opposite sides of zero.

Standard

6.NS.5: Apply the order of operations and properties of operations (i.e., identity, inverse, commutative properties of addition and multiplication, associative properties of addition and multiplication, and distributive property) to evaluate numerical expressions with nonnegative rational numbers, including those using grouping symbols, such as parentheses, and involving whole number exponents. (E)

Evidence Statements

- Explain and demonstrate the order of operations as a flexible strategy for evaluating numerical expressions.
- Evaluate numerical expressions involving positive rational numbers, grouping symbols, and whole number exponents using the order

Academic Vocabulary

- Order of operations
- Properties of operations
- Associative property of addition
- Commutative property of addition
- Additive identity property
- Additive inverse property

<ul style="list-style-type: none"> of operations and/or properties of operations. Justify solutions to numerical expressions, either verbally or written, using the order of operations or properties of operations. 	<ul style="list-style-type: none"> Associative property of multiplication Commutative property of multiplication Multiplicative identity property Multiplicative inverse property Distributive property Exponent Expression Rational number
Clarification Statements	Common Misconceptions
<ul style="list-style-type: none"> Students have been informally using a subsection of the order of operations prior to grade six when determining which operation to perform first in a multi-operational expression. In grade five, students are introduced to powers of 10, and in grade six they extend their understanding of exponential notation, as well as grouping symbols. Students require formal instruction on these concepts. Significant research has shown that the teaching of mnemonics such as PEMDAS (Please Excuse My Dear Aunt Sally) leads students to believe multiplication should always be performed before division and addition should always be performed before subtraction. Use of this mnemonic and others is highly discouraged. In place of using a mnemonic, teachers should provide students with a visual such as the one linked here. This triangle visual aligns multiplication and division at the same level with addition and subtraction aligned the level below. The triangle illustrates the categories of operations students should move through instead of using a meaningless saying. The parentheses are listed outside of the triangle as they may be introduced at any level and, therefore, will change the order. With regard to properties of operations, emphasis should remain on the underlying concepts rather than on memorizing property names. At times, students may incorporate the use of various properties of operations to simplify and/or solve numerical expressions. Teachers should continue to model when it is appropriate to apply these properties and encourage students to utilize them as 	<ul style="list-style-type: none"> Students may apply multiplication before division regardless of the position within the expression. Students may apply addition before subtraction regardless of the position within the expression. Students may multiply the exponent by the base.

necessary. A table of common Properties of Operations is included for teacher reference.	
Looking Back	Looking Ahead
This concept is not specifically addressed in the Indiana Academic Standards prior to this grade level.	7.NS.3: Use the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. (E)
	7.NS.4: Explain that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$ for all nonzero integers. (E)
	7.NS.7: Compute fluently with rational numbers using an algorithmic approach. (E)
Instructional Resources	
<ul style="list-style-type: none"> • Mathematics Grades 5-6 Vertical Articulation Guide • Mathematics Grades 6-8 Vertical Articulation Guide • Learning Progressions & Content Supports: Grade 6 through Grade 8 • Implementing the Mathematical Process Standards: Grades Six through Eight • Order of Operations Triangle Visual • Illustrative Mathematics-Why Do We Need an Order of Operations? • Illustrative Mathematics-You Can Multiply Three Numbers in Any Order • Illustrative Mathematics-Bowling for Numbers • Illustrative Mathematics-Using Operations and Parentheses • Illustrative Mathematics-Watch Out for Parentheses 1 • Illustrative Mathematics-Exponent Experimentation 1 • Open Middle: Order of Operations 	
Universal Supports for All Learners	
<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • What Works Clearinghouse-Concrete-Semi-Concrete-Abstract Video (Print Recommendations) • What Works Clearinghouse-Clear & Concise Mathematical Language Video (Print 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 \(Featuring New ILEARN Item Specifications\)](#)
- [Grade 6 ILEARN Math Desmos 4-Function Calculator](#)
- [UDL Assessment Strategies](#)

Interdisciplinary Connections

Coming Soon

Disciplinary Literacy

Coming Soon

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