Mathematics: Grade 7

Overview

In grade seven, *Algebra and Functions* standards involving one-variable equations and inequalities are supported by fifth grade learning that includes the use of numerical equations to solve real-world problems.[5.CA.2,4,7,8] Students in grade six write and evaluate equivalent linear expressions,[6.NS.7] understand what it means to solve an algebraic equation,[6.AF.2] and solve one-step linear equations with one variable.[6.AF.3] In grade seven, students solve two-step linear equations and inequalities with one variable,[7.AF.3-4] and by grade eight they solve linear equations and inequalities with rational number coefficients with one variable fluently.[8.AF.1] Algebra 1 students use one-variable linear equations with variables on both sides of the equal sign to model real-world situations and solve them fluently.[A1.L.1]

The progression of learning around functions is supported by the fifth grade expectation that students represent real-world situations by graphing ordered pairs on the coordinate plane.[5.CA.11] In sixth grade, students use equations with two variables to model proportional relationships and understand the role of dependent and independent variables.[6.RP.5] Students in grade seven use two-variable equations, as well as graphs and tables, to model real-world proportional relationships.[7.RP.3] Grade seven students also define slope as vertical change divided by horizontal change, use slope to graph lines, and understand constant rate of change as an attribute of linear functions.[7.AF.5-6]

In grade eight, students understand the formal definition of a function, analyze linear functions in multiple representations, and differentiate between linear and nonlinear functions.[8.AF.3-5] Grade eight students also understand what it means to solve a system of linear equations in two unknowns,[8.AF.8] and this concept is developed further in the Algebra I domain entitled *Systems of Linear Equations and Inequalities*. Learning about proportional and linear functions in multiple representations is essential content for high school algebra, which focuses heavily on using linear and nonlinear functions to model real-world relationships between varying quantities.

<table>
<tr><th colspan="2">Algebra and Functions</th></tr>
<tr><td>Learning Outcome</td><td>Students use two variable equations, as well as graphs and tables, to model real-world proportional relationships and connect the constant of proportionality to the idea of slope.</td></tr>
<tr><td>Standard</td><td>7.AF.5: Define slope as vertical change for each unit of horizontal change, and apply that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.</td></tr>
<tr><th colspan="2">Evidence Statements</th><th>Academic Vocabulary</th></tr>
<tr><td colspan="2">• Define slope as vertical change for each unit</td><td>• Slope</td></tr>
</table>

of horizontal change in the context of linear functions, recognizing that a constant rate of change or constant slope describes a linear function. • Identify situations that exhibit constant or varying rates of change or constant or varying slopes.	• Vertical change • Horizontal change • Linear functions • Constant rate of change • Constant slope • Varying rates of change • Average rate of change
Clarification Statements	**Common Misconceptions**
• Provide various situations (e.g., graphically, via a table) for students to identify and describe, emphasizing whether the situations exhibit constant or varying rates of change or constant or varying slopes. Consider having students think about if there is an additive change or a multiplicative change, as this will help with the distinction.	• Students may struggle to identify and describe situations that exhibit constant or varying rates of change or constant or varying slopes. They may also have difficulties in understanding how these rates of change or slopes relate to linear functions. • Students may think that a number doubling is constant.
Looking Back	**Looking Ahead**
6.AF.5: Solve real-world and other mathematical problems by graphing points with rational number coordinates on a coordinate plane. Include the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (E)	**8.AF.3:** Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable), and that the graph of a function is the set of ordered pairs (x,y).
6.RP.5 Use variables to represent two quantities in a proportional relationship in a real-world problem; write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (E)	
Instructional Resources	
• Mathematics Grades 6-8 Vertical Articulation Guide • Learning Progressions & Content Supports: Grade 6 through Grade 8 • Implementing the Mathematics Process Standards: Grades Six to Eight • Fish Tank Learning - Linear Relationships	
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 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 7 & 8 ILEARN Math Desmos Scientific Calculator
- UDL Assessment Strategies

Interdisciplinary Connections

Coming Soon

Disciplinary Literacy

Coming Soon

Contact IDOE's Office of Teaching and Learning with any questions.