

STATE GOAL 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.

Why This Goal Is Important: Algebra unites patterns and quantities in patterns with the means of describing change through the use of variables and functions. Its concepts and analytical methods allow people to consider general solutions to problems with common characteristics and develop related formulas. Algebra provides verbal, symbolic and graphical formats for discussing and representing settings as diverse as the pricing patterns of merchandise in a store, the behavior of a car as it accelerates or slows down, the changes in two chemicals as they react with one another, or the type of variation existing in a comparison of two factors in the economy. All people must be able to use algebraic methods to construct and examine tables of values; to interpret the relationships expressed by patterns in these tables; to relate change and variation in graphs and formulas; to reason about changes in quantities and the relationships involved in changes; and to find solutions to everyday problems using algebra's symbolic manipulation and formulas.

A. Describe numerical relationships using variables and patterns.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL	EARLY HIGH SCHOOL	LATE HIGH SCHOOL
8.A.1a Identify, describe and extend simple geometric and numeric patterns.	8.A.2a Identify, describe, extend and create geometric and numeric patterns.	8.A.3a Apply the basic properties of commutative, associative, distributive, transitive, inverse, identity, zero, equality and order of operations to solve problems.	8.A.4a Use algebraic methods to convert repeating decimals to fractions.	8.A.5 Solve mathematical problems involving recursive patterns and use models that employ such relationships.
8.A.1b Solve simple number sentences (e.g., $2 + \square = 5$).	8.A.2b Construct and solve number sentences using a variable to represent an unknown quantity.	8.A.3b Solve problems using linear expressions, equations and inequalities.	8.A.4b Represent mathematical patterns and describe their properties using variables and mathematical symbols.	

B. Interpret and describe numerical relationships using tables, graphs and symbols.

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8.B.1 Solve problems involving pattern identification and completion of patterns.	8.B.2 Analyze a geometric pattern and express the results numerically.	8.B.3 Use graphing technology and algebraic methods to analyze and predict linear relationships and make generalizations from linear patterns.	8.B.4a Represent algebraic concepts with physical materials, words, diagrams, tables, graphs, equations and inequalities and use appropriate technology.	8.B.5 Use functions including exponential, polynomial, rational, parametric, logarithmic, and trigonometric to describe numerical relationships.
			8.B.4b Use the basic functions of absolute value, square root, linear, quadratic and step to describe numerical relationships.	

C. Solve problems using systems of numbers and their properties.

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8.C.1 Describe the basic arithmetic operations (addition, subtraction, multiplication, division) orally, in writing and using concrete materials and drawings.	8.C.2 Explain operations and number properties including commutative, associative, distributive, transitive, zero, equality and order of operations.	8.C.3 Apply the properties of numbers and operations including inverses in algebraic settings derived from economics, business and the sciences.	8.C.4a Analyze and report the effects of changing coefficients, exponents and other parameters on functions and their graphs.	8.C.5 Use polynomial, exponential, logarithmic and trigonometric functions to model situations.
			8.C.4b Apply algebraic properties and procedures with matrices, vectors, functions and sequences using data found in business, industry and consumer situations.	

D. Use algebraic concepts and procedures to represent and solve problems.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL	EARLY HIGH SCHOOL	LATE HIGH SCHOOL
8.D.1 Find the unknown numbers in whole-number addition, subtraction, multiplication and division situations.	8.D.2 Solve linear equations involving whole numbers.	8.D.3a Solve problems using numeric, graphic or symbolic representations of variables, expressions, equations and inequalities.	8.D.4 Formulate and solve linear and quadratic equations and linear inequalities algebraically and investigate nonlinear inequalities using graphs, tables, calculators and computers.	8.D.5 Formulate and solve nonlinear equations and systems including problems involving inverse variation and exponential and logarithmic growth and decay.
		8.D.3b Propose and solve problems using proportions, formulas and linear functions.		
		8.D.3c Apply properties of powers, perfect squares and square roots.		