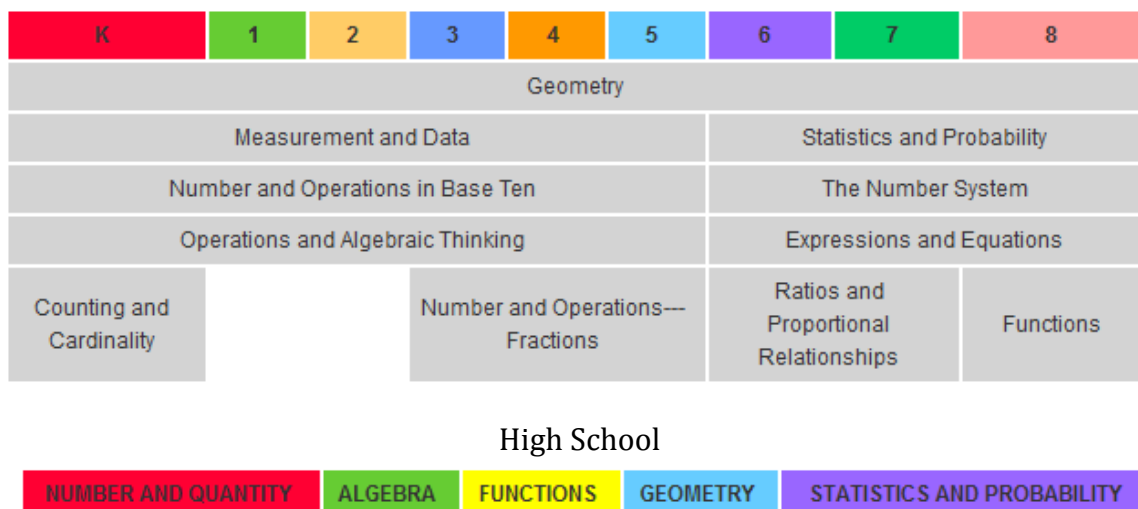


## Algebra and Algebraic Thinking in the CCSS-M Grades 6-12



### 6–8: Expressions and Equations

In Grades 6–8, students start to use properties of operations to manipulate algebraic expressions and produce different but equivalent expressions for different purposes. This work builds on their extensive experience in K–5 working with the properties of operations in the context of operations with whole numbers, decimals and fractions.

#### Grade 6

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

#### Grade 7

- Use properties of operations to generate equivalent expressions.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

#### Grade 8

- Work with radicals and integer exponents.
- Understand the connections between proportional relationships, lines, and linear equations.
- Analyze and solve linear equations and pairs of simultaneous linear equations.

### Grade 8 and High School Functions

Functions describe situations in which one quantity is determined by another. Students in 8<sup>th</sup> grade and throughout high school will explore functions in several ways: Sequences and functions, Functions and modeling and Functions and Algebra.

# Algebra and Algebraic Thinking in the CCSS-M Grades 6-12

## Grade 8

- Define, evaluate, and compare functions.
- Use functions to model relationships between quantities.

## High School: Functions

### Interpreting Functions

- Understand the concept of a function and use function notation.
- Interpret functions that arise in applications in terms of the context.
- Analyze functions using different representations.

### Building Functions

- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.

### Linear and Exponential Models

- Construct and compare linear and exponential models and solve Problems.

### Trigonometric Functions

- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.
- Prove and apply trigonometric identities.

## High School: Algebra

### Seeing Structure in Expressions

- Interpret expressions that represent a quantity in terms of its context.
- Write expressions in equivalent forms to solve problems.

### Arithmetic with Polynomials and Rational Expressions

- Perform arithmetic operations on polynomials.
- Understand the relationship between zeros and factors of polynomials.
- Use polynomial identities to solve problems.
- Rewrite rational functions.

### Creating Equations

- Create equations that describe numbers or relationships.

### Reasoning with Equations and Inequalities

- Understand solving equations as a process of reasoning and explain the reasoning.
- Solve equations and inequalities in one variable.
- Solve systems of equations.
- Represent and solve equations and inequalities graphically.

# Smarter Balanced Claims and Assessment Targets: Algebra and Algebraic Thinking

**Claim 1: Concepts and Procedures (40%)** Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency

## 6<sup>th</sup> Grade

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

## 7<sup>th</sup> Grade

- Use properties of operations to generate equivalent expressions.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

## 8<sup>th</sup> Grade

- Work with radicals and integer exponents.
- Understand the connections between proportional relationships, lines, and linear equations.
- Analyze and solve linear equations and pairs of simultaneous linear equations.
- Define, evaluate, and compare functions.
- Use functions to model relationships between quantities.

## High School

### **Algebra**

- Interpret the structure of expressions.
- Write expressions in equivalent forms to solve problems.
- Perform arithmetic operations on polynomials.
- Create equations that describe numbers or relationships.
- Understand solving equations as a process of reasoning and explain the reasoning.
- Solve equations and inequalities in one variable.
- Represent and solve equations and inequalities graphically.

### **Functions**

- Understand the concept of a function and use function notation.
- Interpret functions that arise in applications in terms of a context.
- Analyze functions using different representations.
- Build a function that models a relationship between two quantities.