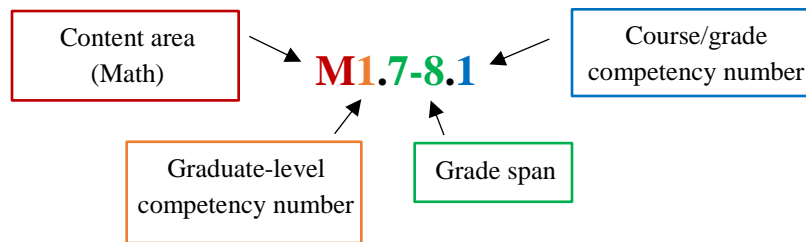


# Grades K-12 Mathematics Competencies

## Competency Coding



## Symbolic Expression

### Graduate-Level Competencies:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

### Course/ Grade Competencies:

- **M1.K-2.1:** The learner will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for different purposes.
- **M1.3-4.1:** The learner will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for a variety of purposes, including variables.
- **M1.5-6.1:** The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.
- **M1.7-8.1:** The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.
- **M1.9-12.1:** The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.
- **M1.9-12.2:** The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.

## Numbers and Number Systems

### Graduate-Level Competencies:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

### Course/ Grade Competencies:

- **M2.K-2.1:** The learner will demonstrate an understanding of the nature of numbers, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers.
- **M2.3-4.1:** The learner will demonstrate an understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers, fractions, and decimals.
- **M2.5-6.1:** The learner will expand their understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using rational numbers.
- **M2.7-8.1:** The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.
- **M2.9-12.1:** The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.

## Reasoning and Strategic Thinking

### Graduate-Level Competencies:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

### Course/ Grade Competencies:

- **M3.K-2.1:** The learner will apply additive reasoning using multiple strategies (algorithms, models, & manipulatives) to solve authentic applied problems.
- **M3.K-2.2:** The learner will use reasoning and self-monitoring to analyze and explain a solution pathway.
- **M3.3-4.1:** The learner will apply additive, multiplicative, and fractional reasoning using multiple strategies (algorithms, models, & manipulatives) to solve authentic applied problems.
- **MS.3-4.2:** The learner will use reasoning and self-monitoring to analyze and justify one or more solution pathways.
- **M3.5-6.1:** The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational numbers.
- **M3.5-6.2:** The learner will use reasoning and metacognitive skills through making conjectures, justifying, and communicating mathematical solutions and arguments.

- **M3.7-8.1:** The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.
- **M3.7-8.2:** The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.
- **M3.9-12.1:** The learner will use computational strategies and algorithms and provide rationale for their use.
- **M3.9-12.2:** The learner will reason quantitatively when analyzing, representing, and solving problems.
- **M3.9-12.3:** The learner will compare the effectiveness or logic of two plausible arguments or models.

## Measurement

### Graduate-Level Competencies:

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

### Course/ Grade Competencies:

- **M4.K-2.1:** The learner will use standard and nonstandard measurement tools, units, and attributes to describe and compare objects, authentic applied situations or events, and to solve measurement problems.
- **M4.3-4.1:** The learner will use measurement tools, units, and attributes to describe and compare objects, situations, or events, and to solve authentic applied measurement problems.
- **M4.5-6.1:** The learner will use tools and apply precision and reasoning to solve measurement problems in authentic applied contexts.
- **M4.7-8.1:** The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.
- **M4.9-12.1:** The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.

## Algebraic Functions, Patterns, and Relations

### Graduate-Level Competencies:

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

### Course/ Grade Competencies:

- **M5.K-2.1:** The learner will make use of structure to represent, interpret, and analyze change or patterns in various contexts using models, rules, and explanations.
- **M5.3-4.1:** The learner will make use of structure to represent, analyze, and generalize change or patterns in various contexts using models and justification.
- **M5.5-6.1:** The learner will make use of structure to describe and compare situations that involve change or patterns, and use the information to make conjectures and justify conclusions/ solutions.
- **M5.7-8.1:** The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.
- **M5.9-12.1:** The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.
- **M5.9-12.2:** The learner will write and apply algebraic modes to represent and answer questions about a given situation.
- **M5.9-12.3:** The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.
- **M5.9-12.4:** The learner will analyze relations and functions, using multiple representations.
- **M5.9-12.5:** The learner will identify, build, and perform operations on relations and functions and justify their reasoning.

## Geometry

### Graduate-Level Competencies:

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

### Course/ Grade Competencies:

- **M6.K-2.1:** The learner will recognize and use attributes of two- and three-dimensional figures to solve problems.
- **M6.3-4.1:** The learner will use attributes of two-dimensional shapes and complex figures to solve authentic applied problems.
- **M6.5-6.1:** The learner will solve problems involving reasoning using properties two- and three- dimensional shapes to analyze, represent, and model geometric relationships in authentic applied contexts.
- **M6.7-8.1:** The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.
- **M6.9-12.1:** The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.

- **M6.9-12.2:** The learner will use geometric theorems and postulates to construct and apply viable arguments.
- **M6.9-12.3:** The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.

## **Data, Analysis, Probability, and Statistics**

### **Graduate-Level Competencies:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

### **Course/ Grade Competencies:**

- **M7.K-2.1:** The learner will gather, represent, and interpret data related to a particular/ single unit scale, including authentic applications.
- **M7.3-4.1:** The learner will gather, represent, and interpret data related to a particular/ single context, including authentic applications.
- **M7.5-6.1:** The learner will design investigations and gather data involving populations (data sets).
- **M7.7-8.1:** The learner will design investigations and conduct probability experiments involving populations.
- **M7.9-12.1:** The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.
- **M7.9-12.2:** The learner will design and implement a plan to collect the appropriate data to answer the statistical question.
- **M7.9-12.3:** The learner will summarize data using appropriate statistics.
- **M7.9-12.4:** The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.
- **M7.9-12.5:** The learner will interpret descriptive statistics and linear models within the context of the data and the original question.
- **M7.9-12.6:** The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.