

The process standards of **problem solving, reasoning and proof, connections communication, and representation** are interwoven and independent with the content standards and are necessary for the comprehensive understanding of mathematics.

Strand: **M1 Numbers and Operations**

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand numbers, ways of representing numbers, relationships among numbers and number systems;
- understand meanings of operations and how they relate to one another;
- understand how to compute fluently and make reasonable estimates.

In Grade 1, all students should:

- Standards:
- M1a:** recognize place values of numbers (ones, tens, and hundreds) and identify groups of each quantity;
 - M1b:** identify and generate equivalent forms of the same number using concrete objects and number statements;
 - M1c:** recognize wholes and parts of wholes, i.e., $\frac{1}{2}$, $\frac{1}{3}$, and, $\frac{1}{4}$;
 - M1d:** express the concepts of addition and subtraction through drawings, number statements and/or verbal explanation, as well as using plus (+) and minus (-) symbols;
 - M1e:** explain the relationship between addition and subtraction as inverse operations;
 - M1f:** explain and perform addition and subtraction of one-digit whole numbers;
 - M1g:** use estimation based on a benchmark and recognize reasonable answers;
 - M1h:** select, explain, and use appropriate computational procedures to solve real-world problems.

Essential To Know: Students use the concept of place value to decompose and compose whole numbers up to 100.
Students explain, model, and demonstrate the meaning of addition and subtraction with whole numbers.

Strand: **M2 Algebra**

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships;
- analyze change in various contexts.

In Grade 1, all students should:

- Standards:
- M2a:** sort, classify, and order objects by two or more attributes and explain how objects were sorted;
 - M2b:** identify, describe, extend and create repeating patterns and number sequences;
 - M2c:** solve open sentences using the commutative property of addition by representing an expression in more than one way;

- M2d:** write mathematical equations using symbols;
- M2e:** model and describe a problem situation using representations, i.e. words, objects, number phrase or sentence;
- M2f:** experiment with equivalency using concrete materials;
- M2g:** identify measurable changes that are predictable, e.g., students grow taller, not shorter, as they get older.

Essential To Know: Students recognize, extend, and create patterns.
Students recognize and describe and describe changes using words and numbers.

Strand: **M3 Geometry**

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations;
- uses visualization, spatial reasoning, and geometric modeling to solve problems.

In Grade 1, all students should:

- Standard:
- M3a:** identify two-dimensional shapes in three-dimensional shapes;
 - M3b:** create new shapes by combining or cutting or taking apart existing shapes;
 - M3c:** describe and name the direction and distance in navigating space, e.g., which way, how far, etc.;
 - M3d:** identify and determine whether two-dimensional shapes are congruent (same shape and size) or similar (same shape different size);
 - M3e:** recognize and explore symmetry;
 - M3f:** recognize geometric shapes and structures in the environment and specify their location.

Essential To Know: Students describe the attributes and parts of two- and three-dimensional shapes.

Strand: **M4 Measurement**

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand measurable attributes of objects and the units, systems, and processes of measurement;
- apply appropriate techniques, tools, and formulas to determine measurements.

In Grade 1, all students should:

- Standard
- M4a:** measure and differentiate objects using both comparative terms and standard units of measure, i.e., inches, centimeters, etc.;
 - M4b:** recognize repeating pattern of time;
 - M4c:** tell time to the hour and half hour using digital and analog timepieces;
 - M4d:** order a sequence of events that occur over time;
 - M4e:** estimate and measure a variety of attributes of objects using standard and nonstandard units;
 - M4f:** make reasonable estimates about the passage of time in commonplace events, e.g., tasks being completed, living things growing, etc.

Essential To Know: Students use standard units of measurement.

Strand: **M5 Data Analysis and Probability**

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on data;
- understand and apply basic concepts of probability.

In Grade 1, all students should:

- Standard: **M5a:** identify multiple categories for sorting data;
- M5b:** collect, organize, represent and interpret data using concrete objects, pictures, tallies, and graphs;
- M5c:** compare and contrast similar data sets;
- M5d:** construct questions that can be answered by using information from a graph or table;
- M5e:** describe events related to student's experiences as more likely or less likely to happen;
- M5f:** read and interpret graphs and tables to make comparisons and predictions.

Essential To Know: Students collect, sort, represent, and analyze data.

Strand: **M6 Problem Solving**

- Standard: **M6a:** Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:
- build new mathematical knowledge through problem solving;
 - solve problems that arise in mathematics and in other contexts;
 - apply and adapt a variety of appropriate strategies to solve problems;
 - monitor and reflect on the process of mathematical problem solving.

Strand: **M7 Reasoning and Proof**

- Standard: **M7a:** Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:
- recognize reasoning and proof as fundamental aspects of mathematics;
 - make and investigate mathematical conjectures;
 - develop and evaluate mathematical arguments and proofs;
 - select and use various types of reasoning and methods of proof.

Strand: **M8 Communication**

- Standard: **M8a:** Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:
- organize and consolidate their mathematical thinking through communication;
 - communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
 - analyze and evaluate the mathematical thinking and strategies of others;
 - use the language of mathematics to express mathematical ideas precisely.

Strand: **M9 Connections**

Standard: **M9a:** Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:

- recognize and use connections among mathematical ideas;
- understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- recognize and apply mathematics in contexts outside of mathematics.

Strand: **M10 Representation**

Standard: **M10a:** Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems;
- use representations to model and interpret physical, social, and mathematical phenomena.