

Mathematics: Kindergarten

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 Kindergarten, all students should:

- Standards:
- M1a:** recognize, write and name cardinal numbers up to 20;
 - M1b:** count and recognize “how many” are in sets of objects;
 - M1c:** compare and order objects using ordinal numbers;
 - M1d:** represent and use sets of objects in multiple ways, including separating (decompose), joining (compose), and ordering sets;
 - M1e:** model and represent addition as combining sets and subtraction as taking away sets;
 - M1f:** demonstrate one-one correspondence using manipulatives or objects from their environment;
 - M1g:** estimate quantities of objects within multiple sets using comparative language, i.e., more than, less than, or about the same.

Essential To Know: Students recognize the relationship between numbers and quantities.

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 Kindergarten, all students should:

- Standards:
- M2a:** describe how objects are alike and different using one or two properties;
 - M2b:** sort, classify, and order objects in more than one way;
 - M2c:** identify, create, copy, and describe sequences of sounds, shapes, motions, and numbers;
 - M2d:** describe, model, and extend AB and ABC patterns;
 - M2e:** model a problem situation using actual objects;
 - M2f:** recognize changes that are measurable.

Essential To Know: Students sort and order objects according to attributes.

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 Kindergarten, all students should:

- Standards:
- M3a:** identify, compare, and sort two- and three-dimensional shapes;
 - M3b:** describe locations to include direction and distance using the language of relative position;
 - M3c:** recognize that two objects having the same shape but oriented differently in space are congruent;
 - M3d:** draw common two-dimensional shapes from memory.

Essential To Know: Students name and describe objects and two- and three-dimensional shapes by their position, direction, and distance.

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 Kindergarten, all students should:

- Standards:
- M4a:** compare and order objects according length, height, capacity, and weight by using descriptors, i.e., longer, shorter, and heavier;
 - M4b:** order events based on time;
 - M4c:** explore ways to measure different attributes of objects;
 - M4d:** explore common instruments for measuring, i.e., scales, rulers, cups, etc., and identify the unit measure of each instrument;
 - M4e:** use measuring instruments or non-standard measurement tools to compare objects, liquids, spaces, and people.

Essential To Know: Students identify and measure attributes of objects.
Students use nonstandard units to measure.

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 Kindergarten, all students should:

- Standards:
- M5a:** gather, sort, and interpret data in response to questions posed, e.g., by class surveys, or teacher/student questions;

M5b: organize and represent data using concrete objects, pictures, and graphs;

M5c: ask and answer questions and make predictions based on data collected.

Essential To Know: Students organize and represent data to formulate a response to a question.

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.