

MATHEMATICS STANDARD ARTICULATED BY GRADE LEVEL

KINDERGARTEN

Strand 1: Number Sense and Operations

Every student should understand and use all concepts and skills from the previous grade levels. The standards are designed so that new learning builds on preceding skills and are needed to learn new skills. Communication, Problem-solving, Reasoning & Proof, Connections, and Representation are the process standards that are embedded throughout the teaching and learning of mathematical strands.

Concept 1: Number Sense

Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.

- PO 1. Make a model to represent a given whole number 0 through 20.
- PO 2. Identify orally a whole number represented by a model with a word name and symbol 0 through 20. (Say 3 and write number 3 when presented with three objects.)
- PO 3. Count aloud, forward to 20 or backward from 10, in consecutive order (0 through 20).
- PO 4. Identify whole numbers through 20 in or out of order.
- PO 5. Write whole numbers through 20 in or out of order.
- PO 6. Construct equivalent forms of whole numbers, using manipulatives, through 10 (e.g., $\square\square + \square\square = \square\square\square + \square$).
- PO 7. Compare two whole numbers through 20.
- PO 8. Recognize the ordinal numbers through fifth (e.g., first, second, third).
- PO 9. Order three or more whole numbers through 20 (least to greatest or greatest to least).
- PO 10. Identify penny, nickel, dime, quarter, and dollar by using manipulatives or pictures.

Concept 2: Numerical Operations

Understand and apply numerical operations and their relationship to one another.

- PO 1. Model addition through sums of 10 using manipulatives.
- PO 2. Model subtraction with minuends of 10 using manipulatives.
- PO 3. Select the operation to solve word problems using numbers 0 through 9.
- PO 4. Solve word problems presented orally using addition or subtraction with numbers through 9.
- PO 5. Identify the symbols: +, -, =.
- PO 6. Use grade-level appropriate mathematical terminology.

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Concept 3: Estimation

Use estimation strategies reasonably and fluently.

PO 1. Solve problems using a variety of mental computations and reasonable estimations.

Strand 2: Data Analysis, Probability, and Discrete Mathematics

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

PO 1. Formulate questions to collect data in contextual situations.

PO 2. Interpret a pictograph.

PO 3. Answer questions about a pictograph.

PO 4. Formulate questions based on data displayed in graphs, charts, and tables.

PO 5. Solve problems based on simple graphs, charts, and tables.

Concept 2: Probability

Understand and apply the basic concepts of probability.

(Grades 2-HS)

Concept 3: Discrete Mathematics – Systematic Listing and Counting

Understand and demonstrate the systematic listing and counting of possible outcomes.

PO 1. Make arrangements that represent the number of combinations that can be formed by pairing items taken from 2 sets, using manipulatives (e.g., How many outfits can one make with 2 different color shirts and 2 different pairs of pants?).

Concept 4: Vertex-Edge Graphs

Understand and apply vertex-edge graphs.

PO 1. Color pictures with the least number of colors so that no common edges share the same color (increased complexity throughout grade levels).

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Strand 3: Patterns, Algebra, and Functions

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Concept 1: Patterns

Identify patterns and apply pattern recognition to reason mathematically.

PO 1. Communicate orally a grade-level appropriate pattern.

PO 2. Extend simple repetitive patterns using manipulatives.

PO 3. Create grade-level appropriate patterns.

Concept 2: Functions and Relationships

Describe and model functions and their relationships.

(Grades 2-HS)

Concept 3: Algebraic Representations

Represent and analyze mathematical situations and structures using algebraic representations.

(Grades 1-HS)

Concept 4: Analysis of Change

Analyze change in a variable over time and in various contexts.

(Grades 1-HS)

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Strand 4: Geometry and Measurement

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Concept 1: Geometric Properties

Analyze the attributes and properties of 2- and 3- dimensional shapes and develop mathematical arguments about their relationships.

PO 1. Identify 2-dimensional shapes by attribute (size, shape, number of sides).

PO 2. Identify concepts and terms of position and size in contextual situations:

- Inside/outside,
- Above/below/between,
- Smaller/larger, and
- Longer/shorter.

PO 3. Identify shapes in different environments (e.g., nature, buildings, classroom).

Concept 2: Transformation of Shapes

Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.

(Grades 1-HS)

Concept 3: Coordinate Geometry

Specify and describe spatial relationships using coordinate geometry and other representational systems.

(Grades 3-HS)

Concept 4: Measurement - Units of Measure - Geometric Objects

Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.

PO 1. Verbally compare objects according to observable and measurable attributes.

PO 2. Communicate orally how different attributes of an object can be measured.

PO 3. Order objects according to observable and measurable attributes.

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Strand 5: Structure and Logic

Concept 1: Algorithms and Algorithmic Thinking

Use reasoning to solve mathematical problems in contextual situations.

(Grades 1-HS)

Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof

Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.

PO 1. Sort objects according to observable attributes.

PO 2. Provide rationale for classifying objects according to observable attributes (color, size, shape, weight, etc.).