

1st Grade Math Proficiency Objectives

Strand One: 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.

- Express whole numbers 0 to 100, in groups of tens and ones using and connecting multiple representations.
- Count forward to 100 and backward from 100 by 1s and 10s using different starting points, and count forward to 100 by 2s and 5s.
- Identify numbers which are 10 more or less than a given number to 90.
- Compare and order whole numbers through 100 by applying the concepts of place value.
- Recognize and compare ordinal numbers, first through tenth.

Concept 2: Numerical Operations

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

- Solve contextual problems using multiple representations for addition and subtraction facts.
- Demonstrate addition and subtraction of numbers that total less than 100 by using various representations that connect to place value concepts.
- Develop and use multiple strategies for addition facts to 10+10 and their related subtraction facts.
- Create word problems based on addition and subtraction facts.
- Apply properties to solve addition/subtraction problems
 - identity property of addition/subtraction and
 - commutative property of addition.

Concept 3: Estimation

Use estimation strategies reasonably and fluently while integrating content from each of the other strands.

- Use estimation to determine if sums are more or less than 5, more or less than 10, or more or less than 20.

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Strand Two: Data Analysis, Probability, and Discrete Math

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Concept 1: Data Analysis (Statistics)

Identify patterns and apply pattern recognition to reason mathematically. Students begin with simple repetitive patterns of many iterations. This is the beginning of recursive thinking. Later, students can study sequences that can best be defined using recursion.

- Collect, record, organize, and display data using tally charts or pictographs.
- Ask and answer questions by interpreting simple displays of data, including tally charts or pictographs.

Concept 2: Probability

Understand and apply the basic concepts of probability. This is the field of mathematics that deals with the likelihood that an event will occur expressed as the ratio of the number of favorable outcomes in the set of outcomes to the total number of possible outcomes.

No performance objectives at this grade level.

Concept 3: Discrete Math – Systematic Listing and Counting

Understand and demonstrate the systematic listing and counting of possible outcomes. This field of mathematics is generally referred to as Combinatorics.

- Use Venn diagrams to sort, classify, and count objects and justify the sorting rule.

Concept 4: Vertex-Edge Graphs

Understand and apply the concepts of vertex-edge graphs and networks. This field connects graph theory with practical problems.

No performance objectives at this grade level.

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Strand Three: Patterns, Algebra, and Functions

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Concept 1: Patterns

Identify patterns and apply pattern recognition to reason mathematically. Students begin with simple repetitive patterns of many iterations. This is the beginning of recursive thinking. Later, students can study sequences that can best be defined using recursion.

- Recognize, describe, extend, create, and record repeating patterns.
- Recognize, describe, extend, create, and record growing patterns.

Concept 2: Functions and Relationships

Describe and model functions and their relationships. For example, distribution and communication networks, laws of physics, population models, and statistical results can all be represented in the symbolic language of algebra.

No performance objectives at this grade level.

Concept 3: Algebraic Representations

Represent and analyze mathematical situations and structures using algebraic representations. Algebraic representation is about abstract structures and about using the principles of those structures in solving problems expressed with symbols.

- *Record equivalent forms of whole numbers to 100 by constructing models and using numbers.*
- *Compare expressions using spoken words and the symbols = and \neq .*
- Represent a word problem requiring addition or subtraction facts using an equation.

Concept 4: Analysis of Change

Analyze how changing the values of one quantity corresponds to change in the values of another quantity.

No performance objectives at this grade level.

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Strand Four: Geometry and Measurement

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Concept 1: Geometric Properties

Analyze the attributes and properties of two- and three-dimensional figures and develop mathematical arguments about their relationships (in conjunction with strand 5, concept 2).

- Identify and draw 2-dimensional geometric figures based on given attributes regardless of size or orientation.
- Compare and sort basic 2-dimensional figures (including irregular figures) using attributes and explain the reasoning for the sorting.
- Describe the results of composing and decomposing 2-dimensional figures.

Concept 2: Transformation of Shapes

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

No performance objectives at this grade level.

Concept 3: Coordinate Geometry

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

No performance objectives at this grade level.

Concept 4: Measurement

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

- Compare and order objects according to length, capacity, and weight.
- Measure and compare the length of objects using the benchmark of one inch.
- Sequence the days of the week and the months of the year.

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Strand Five: Structure and Logic

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: Algorithms and Algorithmic Thinking

Use reasoning to solve mathematical problems. Determine step-by-step series of instructions to explain mathematical processes.

No performance objectives at this grade level.

Concept 2: Logic, Reasoning, Problem Solving, and Proof

Evaluate situations, select problem solving strategies, draw logical conclusions, develop and describe solutions, and recognize their applications. Develop mathematical arguments based on induction and deduction, and distinguish between valid and invalid arguments.

- Identify the question(s) asked and any other questions that need to be answered in order to find a solution.
- Identify the given information that can be used to find a solution.
- Select from a variety of problem-solving strategies and use one or more strategies to arrive at a solution.
- Represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols.
- Explain and clarify mathematical thinking.
- Determine whether a solution is reasonable.