Kindergarten Mathematics

By the end of kindergarten, students understand small numbers, quantities, and simple shapes in their everyday environment. They count, compare, describe and sort objects, and develop a sense of patterns. Students also develop an understanding of measurable attributes of objects.

Curriculum Focal Points

- Number and Operations: Representing, comparing, and ordering whole numbers and joining and separating sets.
- Geometry: Describing shapes and space
- Measurement: Ordering objects by measurable attributes.
  (See Appendix 1 for complete document)

Standard 1: Students will understand simple number concepts and relationships.

Objective 1: Identify and use whole numbers up to 20.

a. Represent whole numbers using concrete, pictorial, and symbolic representations.

b. Order a set of up to ten objects and use ordinal numbers from first to tenth to identify the position of the object in the chosen order.

c. Use one-to-one correspondence when counting a set of objects and develop a strategy for keeping track of counted and uncounted objects.

Objective 2: Identify and use simple relationships among whole numbers up to 20.

a. Estimate quantities in a set of objects using multiples of 10 as benchmark numbers.

b. Compose and decompose quantities to establish a relationship between the parts and the whole.

c. Recognize 5 or 10 as a part of the part-whole relationship of numbers.

d. Compare sets of objects and determine whether they have the same, fewer, or more objects.

Objective 3: Model, describe, and illustrate meanings of addition and subtraction for whole numbers less than ten.

a. Demonstrate the joining and separating of sets of objects to solve problems.

b. Describe the joining or separating of sets with informal language when using models.

c. Record pictorially the results from joining or separating of sets.

d. Introduce symbols for addition, subtraction, and equals (+, -, =)

Mathematical Language and Symbols Students Should Use

add, subtract, first, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth, same, fewer, more, equal

Exploratory Concepts and Skills

√ Count by ones, beginning from any number in the counting sequence.
√ Represent quantities using concrete objects and investigate partitioning of sets.
√ Create problems that can be solved using addition and subtraction.

Standard 2: Students will sort and classify objects as well as recognize and create simple patterns.

Objective 1: Identify, sort, and classify objects according to common attributes.

a. Sort objects into groups by attribute and identify which attribute was used.
b. Describe multiple ways to sort and classify a group of objects.

Objective 2: Identify, duplicate, describe, and extend simple repeating and growing patterns.

a. Identify and describe simple repeating patterns with numbers, colors, letters, and shapes.
b. Duplicate and extend simple repeating patterns with numbers, colors, letters, and shapes.
c. Describe simple growing patterns with shapes.
d. Identify simple patterns in the environment.

Mathematical Language and Symbols Students Should Use
sort, repeating patterns, growing patterns

Exploratory Concepts and Skills
√ Explore skip counting by fives, tens, and twos.

Standard 3: Students will understand basic geometry and measurement concepts as well as collect and organize data.

Objective 1: Identify and create simple geometric shapes and describe simple spatial relationships.

a. Identify, name, describe, and draw circles, triangles, rectangles, and squares in various sizes and orientations.
b. Combine shapes to create two-dimensional objects (e.g., using a triangle and square to create a picture of a house).
c. Use words to describe position and distance.
d. Investigate two- and three-dimensional shapes including hexagons, trapezoids, spheres, cubes, and cones.
e. Divide geometric shapes into equal parts and identify half.

Objective 2: Identify and use measurable attributes of objects and units of measurement.

a. Identify clocks and calendars as tools that measure time.
b. Identify a day, week, and month on a calendar and name the days of the week in order.
c. Identify pennies, nickels, dimes, and quarters as units of money.
d. Compare two objects by measurable attributes (i.e., length, weight) and order several objects by measurable attributes (i.e., length, weight).

Objective 3: Collect and organize simple data.

a. Pose questions and gather data about self and surroundings.
b. Organize data obtained from sorting and classifying objects.

Mathematical Language and Symbols Students Should Use
circle, triangle, rectangle, square, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, penny, nickel, dime, quarter, shorter, longer, above, below, near, far, between, on, over, under, top, bottom, up, down

Exploratory Concepts and Skills
√ Measure objects using non-standard units.
√ Identify the value of a penny, nickel, dime, and quarter.
√ Organize data in lists, tables, and simple graphs.

First Grade Mathematics

By the end of grade one, students understand and use the concept of ones and tens in the base-ten number system. Students understand the meaning of addition and subtraction and add and subtract small numbers with ease. They measure with simple units and extend their understanding of geometric figures in their environment. They represent, describe, and interpret data and analyze and solve simple problems.

Curriculum Focal Points
- *Number and Operations and Algebra*: Developing understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts.
- *Number and Operations:* Developing an understanding of whole number relationships, including grouping in tens and ones.
- *Geometry:* Composing and decomposing geometric shapes.
(See Appendix I for complete document)

Standard 1: Students will acquire number sense and perform simple operations with whole numbers.

Objective 1: Represent and use whole numbers up to 100.
a. Count, read, and writes whole numbers.
b. Represent whole numbers using the number line, models, and number sentences.
c. Represent whole numbers greater than 10 in groups of tens and ones using objects, pictures, and expanded notation.

Objective 2: Identify simple relationships among whole numbers up to 100.
a. Compare and order sets of objects and numbers using the terms greater than, less than, and equal to when describing the comparisons.
b. Make reasonable estimates of the quantitative difference between two sets of objects.
c. Identify one more, one less, 10 more, and 10 less than a given number.
d. Identify numbers missing from a counting sequence.

e. Represent part-whole relationships using the number line.
f. Use fractions to identify parts of a whole.

Objective 3: Model, describe, and illustrate the meanings of addition and subtraction and use these operations to solve problems.

a. Use a variety of models, including objects, length-based models, the number line and the ten frame to describe problem types (i.e., part-whole, combine, separate, compare).
b. Use the properties of addition (i.e., commutative, associative, identity element) and the mathematical relationship between addition and subtraction to solve problems.
c. Compute basic addition facts (up to 10 + 10) and the related subtraction facts using strategies (e.g., 6 + 7 = (6 + 4) + 3 = 10 + 3 = 13).
d. Find the sum of three one-digit numbers.

Mathematical Language and Symbols Students Should Use
add, sum, subtract, difference, greater than, less than, equal to

Exploratory Concepts and Skills
√ Use concrete materials to investigate situations that lead to multiplication and division.
√ Develop and use strategies for addition and subtraction of multi-digit whole numbers.
√ Investigate the meaning of fraction concepts.
√ Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally.

Standard 2: Students will identify and use number patterns to describe and represent mathematical relationships.

Objective 1: Recognize, describe, and represent patterns with more than one attribute.

a. Sort and classify objects using more than one attribute.
b. Identify, create, and label repeating patterns using objects, pictures, and symbolic notation.
c. Identify, create, and label growing patterns using objects, pictures, and symbolic notation.
d. Use patterns to establish skip counting by twos, fives, and tens.

Objective 2: Recognize and represent mathematical relationships using symbols and use number sentences with operational symbols to solve problems.

a. Recognize that "=" indicates that the two sides of an equation are expressions of the same number.
b. Recognize that "+" indicates the joining of sets and that "-" indicates the separation of sets.
c. Write and solve number sentences from problem situations involving addition and subtraction, using symbolic notation for the missing value (e.g., □ + 4 = 7).
d. Create problem situations from given number sentences involving addition and subtraction.

Mathematical Language and Symbols Students Should Use
sort, attribute, repeating patterns, growing patterns, skip count, number sentence, symbol, +, -, =

Exploratory Concepts and Skills
√ Investigate situations with variables as unknowns and as quantities that vary.

Standard 3: Students will understand simple geometry and measurement concepts.

Objective 1: Identify, describe, and create simple geometric shapes.

a. Name, create, and sort geometric plane figures (i.e., circle, triangle, rectangle, square).

b. Identify geometric plane and solid figures (i.e., circle, triangle, rectangle, square, trapezoid) in the students' environment.

c. Compose and decompose plane and solid figures (e.g., make two triangles from a square) and describe the part-whole relationships, the attributes of the figures, and how they are different and similar.

Objective 2: Identify measurable attributes of objects and units of measurement, and use appropriate techniques and tools to determine measurements.

a. Identify the appropriate tools for measuring length, weight, capacity, temperature, and time.

b. Measure the length of an object using standard and nonstandard units and count the units using groups of tens and ones.

c. Identify the value of a penny, nickel, dime, quarter, and dollar, and determine the value of a set of the same coins that total 25¢ or less (e.g., a set of 5 nickels equals 25¢).

d. Tell time to the hour and half-hour.

e. Name the months of the year and seasons in order, and use a calendar to determine the day of the week and date.

Objective 3: Collect, organize, and represent simple data.

a. Collect and represent data using tables, tally marks, pictographs, and bar graphs.

b. Describe and interpret data.

Mathematical Language and Symbols Students Should Use
circle, triangle, rectangle, square, trapezoid, hexagon, rhombus, parallelogram, cube, sphere, cone, penny, nickel, dime, quarter, dollar, January, February, March, April, May, June, July, August, September, October, November, December, winter, spring, summer, fall, data, value, graph, tally mark

Exploratory Concepts and Skills
√ Compare objects using standard and non-standard units.
√ Interpret data from charts and graphs.

Second Grade Mathematics

By the end of grade two, students understand place value and number relationships in addition and subtraction and they model simple concepts of multiplication and division. They measure quantities with appropriate units. They classify shapes and see relationships among them by paying attention to their geometric attributes. They collect and analyze data and verify the answers.

Curriculum Focal Points

- *Number and Operations:* Developing an understanding of the base-ten numeration system and place-value concepts.
- *Number and Operations and Algebra:* Developing quick recall of addition facts and related subtraction facts and fluency with multi-digit addition and subtraction.
- *Measurement:* Developing an understanding of linear measurement and facility in measuring lengths.
  (See Appendix I for complete document.

Standard 1: Students will acquire number sense with whole numbers and operations with whole numbers.

Objective 1: Identify and represent the relationships among numbers, quantities, and place value in whole numbers up to 1000.

a. Represent whole numbers in groups of hundreds, tens, and ones using base ten models and write the numeral representing the set in standard and expanded form.
b. Identify the place and the value of a given digit in a three-digit numeral.
c. Represent the composition and decomposition of numbers in a variety of ways.
d. Compare and order numbers using the terms, greater than, less than, or equal to, and the symbols, >, <, and =, using various strategies, including the number line.
e. Identify and describe even and odd whole numbers.

Objective 2: Use unit fractions to identify parts of the whole and parts of a set.

a. Divide geometric shapes into two, three, or four equal parts and identify the parts as halves, thirds, or fourths.
b. Divide sets of objects into two, three, or four parts of equal number of objects and identify the parts as halves, thirds, or fourths.
c. Represent the unit fractions 1/2, 1/3, 1/4 and 1/8 with objects, pictures, words (e.g., ___out of ___ equal parts), and symbols.

Objective 3: Estimate, model, illustrate, describe, and solve problems involving two- and three-digit addition and subtraction.

a. Demonstrate quick recall of addition facts (up to 10 + 10) and related subtraction facts.
b. Model addition and subtraction of two- and three-digit whole numbers (sums and minuends to 1000) in a variety of ways.

c. Write a story problem that relates to a given addition or subtraction equation, and write a number sentence to solve a story problem that is related to the environment.
d. Demonstrate fluency with two- and three-digit addition and subtraction problems, using efficient, accurate, and generalizable strategies that include standard algorithms and mental arithmetic, and describe why the procedures work.
e. Use the mathematical relationship between addition and subtraction and properties of addition to model and solve problems.

Objective 4: Model, illustrate, and pictorially record solutions to simple multiplication and division problems.

a. Represent multiplication with equal groups using concrete objects and skip counting by twos, fives, and tens.
b. Represent division as fair shares using concrete objects or pictures.

Mathematical Language and Symbols Students Should Use
number line, add, sum, subtract, difference, greater than, less than, equal to, >, <, =, even, odd, halves, thirds, fourths, 1/2, 1/3, 1/4, 1/8.

Exploratory Concepts and Skills
√ Investigate addition of common fractions (e.g., ½ + ½ = 1, ¼ + ¼ = ½).
√ Investigate comparing fractions in terms of greater than, less than, and equal to.
√ Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally.

Standard 2: Students will model, represent, and interpret patterns and number relationships to create and solve problems with addition and subtraction.

Objective 1: Recognize, describe, create, and extend growing patterns.

a. Determine the next term in linear patterns (e.g., 2, 4, 6…; the number of hands on one person, two people, three people).
b. Construct models and skip count by twos, threes, fives, and tens and relate to repeated addition.

Objective 2: Model, represent, and interpret number relationships using mathematical symbols**.**

a. Recognize that "≠" indicates a relationship in which the two sides of the inequality are expressions of different numbers.
b. Recognize that symbols such as *x,* □, or □, in an addition or subtraction equation represent a number that will make the statement true.
c. Use the commutative and associative properties of addition to simplify calculations.

Mathematical Language and Symbols Students Should Use
patterns, +, -, =, ≠

Exploratory Concepts and Skills
√ Investigate situations with variables as unknowns and as quantities that vary.

Standard 3: Students will understand simple geometry and measurement concepts as well as collect, represent, and draw conclusions from data.

Objective 1: Describe, classify, and create geometric figures.

a. Describe and classify plane and solid geometric figures (i.e., circle, triangle, rectangle, square, trapezoid, rhombus, parallelogram, pentagon, hexagon, cube, sphere, cone) according to the number of sides and angles or faces, edges, and vertices.

b. Compose and decompose shapes and figures by substituting arrangements of smaller shapes for larger shapes or substituting larger shapes for arrangements of smaller shapes.

c. Compose and decompose shapes and figures and describe the part-whole relationships, similarities, and differences.

d. Identify points, lines, line segments, and parallel lines.

Objective 2: Identify and use units of measure, iterate (repeat) that unit, and compare the number of iterations to the item being measured.

a. Identify and use measurement units to measure, to the nearest unit, length (i.e., inch, centimeter), weight in pounds, and capacity in cups.

b. Estimate and measure length by iterating a nonstandard or standard unit of measure.

c. Use different units to measure the length of the same object and recognize that the smaller the unit, the more iterations needed to cover a given length.

d. Determine the value of a set of up to five coins that total $1.00 or less (e.g., three dimes, one nickel, and one penny equals 36¢).

e. Tell time to the quarter-hour and sequence a series of daily events by time (e.g., breakfast at 7:00 a.m., school begins at 9:00 a.m., school ends at 3:00 p.m.).

Objective 3: Collect, record, organize, display, and interpret numerical data.

a. Collect and record data systematically, using a strategy for keeping track of what has been counted.

b. Organize and represent the same data in more than one way.

c. Organize, display, and label information, including keys, using pictographs, tallies, bar graphs, and organized tables.

d. Describe data represented on charts and graphs and answer simple questions related to data representations.

Mathematical Language and Symbols Students Should Use

inch, centimeter, pound, cup, circle, triangle, rectangle, square, trapezoid, rhombus, parallelogram, pentagon, hexagon, cube, sphere, cone, vertices, angle, face, edge, weight, length, capacity, line, line segment, parallel lines, points

Exploratory Concepts and Skills

√ Use verbal instructions to move within the environment.

√ Determine simple equivalencies of measurements.

√ Conduct simple probability experiments.