



Mathematics Curriculum

Lower Elementary - Grade 1

2.1 Numbers and Operations in Base 10

PA Standards

2.1.1.B.1 - Extend the counting sequence to read and write numerals to represent objects within 120.

2.1.1.B.2 - Use place value concepts to represent amounts of tens and ones and to compare two-digit numbers.

2.1.1.B.3 - Use place value concepts and properties of operations to add and subtract within 100.

Expectations for Students

- Count to 120, starting at any number, and read and write numerals
- Understand the meaning of tens and ones in a two-digit number
- Decompose two-digit numbers
- Compare two-digit numbers using symbols
- Mentally find ten more or ten less than a two-digit number
- Use place value models, drawings, or strategies to add a two-digit number and a multiple of 10, and to subtract a multiple of 10 from a multiple of 10
- Solve word problems using these skills

2.2 Operations and Algebraic Thinking

PA Standards

2.2.1.A.1 - Represent and solve problems involving addition and subtraction within 20.

2.2.1.A.2 - Understand and apply properties of operations and the relationship between addition and subtraction.

CC.2.1.2.B.3 - Use place value understanding and properties of operations to add and subtract within 1,000.

CC.2.2.2.A.1 - Represent and solve problems involving addition and subtraction within 100.

2.2.2.A.3 - Work with equal groups of objects to gain foundations for multiplication.

M03.B-0.3.1.7 - Identify the missing symbol (+, -, <, >, =) and numbers.

Expectations for Students

- Explore strategies for addition and subtraction within 20
- Gain fluency with addition and subtraction facts within 20

- Use place value models, drawings, or strategies to add a two-digit number and a one-digit number
- Solve word problems using addition and subtraction strategies
- Skip counting
(**Beginning Skill**) Multiplication strategies: *Repeated addition - Share equally – Array - Draw a picture*
- Ability to complete division problems with one digit divisor using golden beads , stamp game and division bead board
- Ability to complete multiplication problems with one digit multiplier using golden beads, stamp game, and multiplication bead board
- Ability to construct fact families for addition and subtraction

2.3 Geometry

PA Standards

2.3.1.A.1 - Compose and distinguish between two- and three-dimensional shapes based on their attributes.

2.3.1.A.2 - Use the understanding of fractions to partition shapes into halves and fourths.

Expectations for Students

- Recognize the defining attributes of flat and solid shapes
- Describe and draw shapes based on their attributes
- Compose and decompose shapes
- Partition shapes in halves and fourths in different ways
- Describe a whole by talking about its parts using words like halves, fourths and quarters
- Understand that when decomposing a whole into equal parts, the parts get smaller
- Understand that fractions can show parts of a set
- Solve word problems using the above skills
- Draw, build, label and identify lines and angles

2.4 Measurement and Data

PA Standards

2.4.1.A.2 - Tell and write time to the nearest half hour using both analog and digital clocks.

2.4.1.A.1 - Order lengths and measure them both indirectly and by repeating length units.

2.4.1.A.4 - Represent and interpret data using tables/charts

Expectations for Students

- Recognize and know the value of coins
- Count set of LIKE coins (pennies, nickels, dimes)
- Understand the clock face
- Tell time to the hour and half hour
- Connect analog and digital displays
- Understand elapsed time
- Compare and order three objects by length; Compare the length of two objects based on the length of a third object
- Measure length by lining up objects end to end; Understand that the measurement of an object differs when different sized units are lined up
- Measure objects using inches and centimeters with a ruler
- Organize and represent up to three categories of data
- Describe and interpret data; Answer questions about data
- Solve word problems involving the above skills
- Explorations with coins at the first grade level provide a foundation for those problem solving experiences in second grade.

Activities and Experiences

Anchor Charts/math notebook notes
 Teacher Demonstrations
 Montessori manipulatives
 Fact families
 Vocabulary (Cards, Strategies, and Lists)
 Small Group Interventions
 Fact Fluency
 Graphic Organizers
 Guided Practice
 Higher-Level Questioning
 Projects

Materials and Resources

Albanesi lesson cards and assessments	Snake Game
Golden Beads	Fraction box
Stamp Game	Fraction insets
Bead frame	Metal insets
Chains	Geometric cabinet
Addition and subtraction stripboard	Geometric solids
Multiplication bead board	Triangle box
Sequin boards	Rectangle box
100 board	Hexagon box
addition/subtraction/multiplication fingerboards	Blue triangle box
	Stick box
Bead boxes	
Clock and clock cards	

Assessments

Albanesi assessments
 Fact Fluency
 Higher-Level Questioning Projects
 Teacher Observations
 Presentations



Mathematics Curriculum

Lower Elementary - Grade 2

2.1 Numbers and Operations in Base Ten

PA Standards

2.1.2.B.1 - Use place value concepts to represent amounts of tens and ones and to compare three-digit numbers.

2.1.2.B.2 - Use place value concepts to read, write, and skip count to 1,000.

M03.A-T.1.1.1 - Round two- and three-digit whole numbers to the nearest ten or hundred, respectively.

M03.B-0.3.1.7 - Identify the missing symbol (+, -, x, ÷, <, >, =) and numbers.

Expectations for Students

- Understand, read, and write place value to 1,000
- Decompose numbers in different ways based on place value
- Mentally add and subtract 10 and 100 to and from three-digit numbers (if you add a 10 to 326, the only digit that will change is the digit in the tens place)
- Compare, order, and count three-digit numbers
- Even and odd numbers
- Skip counting
- Problem solve
- Round numbers
- Expanded notation

2.1 Numbers and Operations – Fractions

PA Standards

M03.A-F.1.1.1 - Demonstrate that when a whole or set is partitioned into y equal parts, the fraction $1/y$ represents 1 part of the whole and/or the fraction x/y represents x equal parts of the whole (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary).

M03.A-F.1.1.3 - Recognize and generate simple equivalent fractions (limit the denominators to 1, 2, 3, 4, 6, and 8 and limit numerators to whole numbers less than the denominator).

M03.A-F.1.1.4 - Express whole numbers as fractions, and/or generate fractions that are equivalent to whole numbers (limit denominators to 1, 2, 3, 4, 6, and 8).

M03.A-F.1.1.5 - Compare two fractions with the same denominator (limit denominators to 1, 2, 3, 4, 6, and 8), using the symbols $>$, $=$, or $<$, and/or justify the conclusions.

Expectations for Students

- Represent fractions
- Equivalent fraction
- Whole numbers as fractions
- Compare fractions
- Put fractions in lowest terms
- Add with like denominators

2.2 Algebraic Concepts – Operations and Algebraic ThinkingPA Standards

2.1.2.B.3 - Use place value understanding and properties of operations to add and subtract within 1,000.

2.2.2.A.1 - Represent and solve problems involving addition and subtraction within 100

2.2.2.A.2 - Use mental math strategies to add and subtract within 20.

2.2.2.A.3 - Work with equal groups of objects to gain foundations for multiplication.

M03.B-0.2.1 - Understand and apply the commutative property of multiplication.

Expectations for Students

- Basic addition strategies
- Basic subtraction strategies
- Problem solve with basic facts through 20
- Add two-digit, three-digit, and four-digit numbers without regrouping
- Add two-digit and three-digit and four-digit numbers with regrouping
- Subtract two-digit, three-digit and four-digit numbers without regrouping
- Subtract two-digit, three-digit and four-digit numbers with regrouping
- Problem solve with two- and three-digit numbers, including multi-step problem solving with numbers within 100
- Multiplication strategies: Repeated addition - Share equally – Array - Draw a picture
- One and two-digit multiplier with stamp game, bead frame, and checkerboard
- 1 digit divisor with stamp game and division bead board
- Construct fact families for multiplication and division.

2.3 GeometryPA Standards

2.3.2.A.1 - Analyze and draw two- and three-dimensional shapes having specified attributes.

2.3.2.A.2 - Use the understanding of fractions to partition shapes into halves, quarters, and thirds.

Expectations for Students

- Identify and describe attributes of 2D shapes
- Identify and describe attributes of quadrilaterals
- Identify and describe attributes of 3D shapes
- Problem solve 2D and 3D shapes

2.4 Measurement and Data

PA Standards

2.4.2.A.3 - Solve problems and make change using coins and paper currency with appropriate symbols.

2.4.2.A.2 - Tell and write time to the nearest minute using both analog and digital clocks. *Find elapsed time to the half hour.

2.4.2.A.1 - Measure and estimate lengths in standard units using appropriate tools.

2.4.2.A.6 - Extend the concepts of addition and subtraction to problems involving length (Perimeter) (B-beginning skill).

2.4.2.A.4 - Represent and interpret data using line plots, pictographs, tally charts, bar graphs, and tables.

Expectations for Students

- Identify, count, compare, make sets, and make change using coins
- Problem Solve: Add and subtract to solve one- and two-step word problems using money
- Tell and write time using analog and digital clocks to the nearest hour, half hour, and five minutes
- Problem solve: Elapsed time
- **(Beginning Skill)** Perimeter: Measure and estimate lengths in standard units using appropriate tools
- Problem solve: Comparing lengths
- Represent and interpret data using line plots, pictographs, tally charts, bar graphs, and tables
- Problem solve: Use graphs to solve word problems
- Capacity
- Comparison of quantities metric

Activities and Experiences

Anchor Charts
 Class Discussions
 Critical Thinking
 Fact Fluency
 Flexible Groups
 Graphic Organizers
 Guided Practice
 Higher-Level Questioning
 Journals
 Montessori Manipulatives

Presentations
 Projects
 Small Group Interventions
 Teacher Demonstrations
 Teacher Observations
 Technology Integration
 Internet Resources
 Vocabulary (Cards, Strategies, and Lists)

Materials and Resources

Albanesi lesson cards and assessments
 Golden Beads
 Stamp Game
 Bead frame
 Chains
 Addition and subtraction stripboard
 Multiplication bead board
 Sequin boards
 100 board
 addition/subtraction/multiplication
 fingerboards
 Snake Game

Fraction box
 Fraction insets
 Metal insets
 Geometric cabinet
 Geometric solids
 Triangle box
 Rectangle box
 Hexagon box
 Blue triangle box
 Stick box
 Multiplication skip counting board

Bead boxes
 Checkerboard

Assessments

Albanesi assessments
 Fact Fluency
 Higher-Level Questioning Projects
 Teacher Observations
 Presentations



Mathematics Curriculum

Lower Elementary - Grade 3

2.1 Numbers and Operations – Base Ten

PA Standards

M03.A-T.1.1.4 - Order a set of whole numbers from least to greatest or greatest to least (up through 9,999; limit sets to no more than four numbers).

M03.B-0.3.1.5 - Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain those using properties of operations.

M03.B-0.3.1.3 - Assess the reasonableness of answers. Limit problems posed with whole numbers and having whole number answers.

M03.A-T.1.1.2 - Add two- and three- digit whole numbers (limit sums from 100 through 1,000).

M03.A-T.1.1.2 - Subtract two-digit and three-digit numbers from three-digit whole numbers.

M03.B-0.3.1.7 - Identify the missing symbol (+, -, x, ÷, <, >, =) and numbers.

Expectations for Students

- Place value through ten thousands
- Compare and order numbers
- Round numbers
- Properties of addition
- Estimate sums: Reasonableness
- Add with regrouping and regrouping through thousands abstractly
- Subtraction - regroup through hundreds and regroup across zeros
- Problem solve – addition and subtraction

2.1 Numbers and Operations – Fractions

PA Standards

M03.A-F.1.1.1 - Demonstrate that when a whole or set is partitioned into y equal parts, the fraction $1/y$ represents 1 part of the whole and/or the fraction x/y represents x equal parts of the whole (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary).

M03.A-F.1.1.2 - Represent fractions on a number line (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary).

M03.A-F.1.1.3 - Recognize and generate simple equivalent fractions (limit the denominators to 1, 2, 3, 4, 6, and 8 and limit numerators to whole numbers less than the denominator).

M03.A-F.1.1.4 - Express whole numbers as fractions, and/or generate fractions that are equivalent to whole numbers (limit denominators to 1, 2, 3, 4, 6, and 8).

M03.A-F.1.1.5 - Compare two fractions with the same denominator (limit denominators to 1, 2, 3, 4, 6, and 8), using the symbols $>$, $=$, or $<$, and/or justify the conclusions.

Expectations of Students

- Represent fractions
- Equivalent fractions
- Whole numbers as fractions
- Compare fractions
- Add fractions with like denominators

2.2 Algebraic Concepts

PA Standards

M03.B-0.1.1.1 - Interpret and/or describe products of whole numbers (up to and including 10×10).

M03.A-T.1.1.3 - Multiply one-digit whole numbers by two-digit multiples of 10 (from 10 through 90).

M03.B-0.1.2.1 - Use multiplication (up to and including 10×10) and/or division (limit dividends through 50, and limit divisors and quotients through 10) to solve word problems in situations involving equal groups, arrays, and/or measurement quantities.

M03.B-0.3.1.5 - Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain patterns using properties of operations.

M03.B-O.2.1.1 - Apply the commutative property of multiplication (not identification or definition of the property).

M03.B-0.2.1.2 - Apply the associative property of multiplication (not identification or definition of the property).

M03.B-O.3.1.1 - Solve two-step word problems using the four operations (expressions are not explicitly stated). Limit to problems with whole numbers and having whole-number answers.

M03.B-0.3.1.2 - Represent two-step word problems using equations with a symbol standing for the unknown quantity. Limit to problems with whole numbers and having whole-number answers.

M03.B-0.3.1.4 - Solve two-step equations using order of operations (equation is explicitly stated with no grouping symbols).

M03.B-0.3.1.5 - Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain patterns using properties of operations.

M03.B-0.3.1.7 - Identify the missing symbol ($+$, $-$, \times , \div , $<$, $>$, $=$) that makes a number sentence true.

M03.B-0.1.2.2 - Determine the unknown whole number in a multiplication (up to and including 10×10) or division (limits dividends through 50 and limit divisors and quotients through 10) equation relating three whole numbers.

M03.B-0.1.1.2 - Interpret and/or describe whole-number quotients of whole numbers (limit dividends through 50, and limit divisors and quotients through 10).

M03.B-0.1.2.1 - Use multiplication (up to and including 10×10) and/or division (limit dividends through 50, and limit divisors and quotients through 10) to solve word problems in situations involving equal groups, arrays, and/or measurement quantities.

M03.B-0.2.2.1 - Interpret and/or model division as a multiplication equation with an unknown factor.

M03.B-0.3.1.5 - Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain patterns using properties of operations.

M03.B-0.1.2.1 - Use multiplication (up to and including 10×10) and/or division (limit dividends through 50, and limit divisors and quotients through 10) to solve word problems in situations involving equal groups, arrays, and/or measurement quantities.

M03.B-0.1.2.2 - Determine the unknown whole number in a multiplication (up to and including 10×10) or division (limits dividends through 50 and limit divisors and quotients through 10) equation relating three whole numbers.

M03.B-0.3.1.4 - Solve two-step equations using order of operations (equation is explicitly stated with no grouping symbols).

Expectations for Students

- Introduction to multiplication: Arrays Repeated addition Equal groups Number line
- Multiply digits 0-10
- Use a multiplication table
- Properties of multiplication
- Divide digits 0-10
- Divide using a table
- Understand the definition of multiple and factor
- Problem solve multi-step problems, patterns, number sentences, order of operations
- Two-digit divisor with racks and tubes
- Two and three- digit multiplier with checkerboard

2.3 Geometry

PA Standards

M03.C-G.1.1.1 - Explain that shapes in different categories may share attributes and that shared attributes can define a larger category.

M03.C-G.1.1.2 - Recognize rhombi, rectangles, and squares as examples of quadrilaterals and/or draw examples of quadrilaterals that do not belong to any of these subcategories.

M03.C-G.1.1.3 - Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

Expectations for Students

- Characteristics of Polygons

2.4 Measurement and Data

PA Standards

M03.D-M.1.2.3 - Use a ruler to measure lengths to the nearest quarter inch or centimeter.

M03.D-M.1.2.1 - Measure and estimate liquid volumes and masses of objects using standards units (cups [c], pints [pt], quarts [qt], gallons [gal], ounces [oz], and pounds [lb]) and metric units (liters [l], grams [g], and kilograms [kg]).

M03.D-M.1.2.2 - Add, subtract, multiply, and divide to solve one-step word problems involving masses or liquid volumes that are given in the same units.

M03.D-M.3.1.1 - Measure areas by counting unit squares (square cm, square m, square in., square ft., and non-standard square units).

M03.D-M.3.1.2 - Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole number products as rectangular areas in mathematical reasoning.

M03.D-M.4.1.1 - Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, exhibiting rectangles with the same perimeter and different areas, and exhibiting rectangles with the same area and different perimeters. Use the same units throughout the problem.

M03.D-M.1.3.2 - Make change for an amount up to \$5.00 with no more than \$2.00 change given (penny, nickel, dime, quarter, and dollar).

M03.D-M.1.3.1 - Compare total values of combinations of coins (penny, nickel, dime, quarter) and/or dollar bills less than \$5.00.

M03.D-M.1.3.3 - Round amount of money to the nearest dollar.

M03.D-M.1.1.1 - Tell, show, and/or write time (analog) to the nearest minute.

M03.D-M.1.1.2 - Calculate elapsed time to the minute in a given situation (total elapsed time limited to 60 minutes or less).

M03.D-M.2.1.1 - Complete a scaled pictograph and a scaled bar graph to represent a data set with several categories (scales limited to 1, 2, 5, and 10).

M03.D-M.2.1.2 - Solve one- and two-step problems using information to interpret data presented in scaled pictographs and scaled bar graphs (scales limited to 1, 2, 5, and 10).

M03.D-M.2.1.4 - Translate information from one type of display to another. Limit to pictographs, tally charts, bar graphs, and tables.

M03.D-M.2.1.3 - Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Display the data by making a line plot, where the horizontal scale is marked in appropriate units - whole numbers, halves, or quarters.

Expectations for Students

- Attributes of liquid volume, mass, and length of objects
- Perimeter and area
- Make change (up to \$5.00)
- Compare money
- Round money
- Tell time to the minute
- Understand elapsed time
- Collect and organize data
- Pictographs
- Bar graphs
- Line plots

Activities and Experiences

Class Discussions

Fact Fluency

Flexible Groups

Graphic Organizers

Guided Practice

Higher-Level Questioning

Journals

Montessori Manipulatives

Presentations

Projects

Small Group Interventions

Teacher Demonstrations

Technology Integration

Internet Resources

Vocabulary (Cards, Strategies, and Lists)

Materials and Resources

Anchor Charts

Albanesi lesson cards and assessments

Golden Beads

Stamp Game

Bead frame

Chains

Addition and subtraction stripboard

Multiplication bead board

Sequin boards

100 board

addition/subtraction/multiplication

fingerboards

Bead boxes

Checkerboard

Racks and tubes

Snake Game

Fraction box

Fraction insets

Metal insets

Geometric cabinet

Geometric solids

Triangle box

Rectangle box

Hexagon box

Blue triangle box

Stick box

Multiplication skip counting board

Assessments

Albanesi assessments

Fact Fluency

Higher-Level Questioning Projects

Teacher Observations

Presentations