Grade Level Expectations for the Sunshine State Standards

Mathematics
Grades 3-5

FLORIDA DEPARTMENT OF EDUCATION
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Sunshine State Standards

Grade Level Expectations

Mathematics 3-5

Strand A: Number Sense, Concepts, and Operations
Standard 1: The student understands the different ways numbers are represented and used in the real world.

Benchmark MA.A.1.2.1: The student names whole numbers combining 3-digit numeration (hundreds, tens, ones) and the use of number periods, such as ones, thousands, and millions and associates verbal names, written word names, and standard numerals with whole numbers, commonly used fractions, decimals, and percents.

Grade Level Expectations
The student:

Third

1. reads, writes, and identifies whole numbers through hundred thousands or more.
2. reads, writes, and identifies proper fractions with denominators including 2, 3, 4, 5, 6, 8, 10, and 100.
3. reads, writes, and identifies decimal notation in the context of money.

Fourth

1. reads, writes, and identifies whole numbers through millions or more.
2. reads, writes, and identifies fractions and mixed numbers with denominators including 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 100, and 1000.
3. reads, writes, and identifies decimals through hundredths.

Fifth

1. reads, writes, and identifies whole numbers, fractions, and mixed numbers.
2. reads, writes, and identifies decimals through thousandths.
3. reads, writes, and identifies common percents including 10**%**, 20**%**, 25**%**, 30**%**, 40**%**, 50**%**, 60**%**, 70**%**, 75**%** , 80**%**, 90**%**, and 100**%**.

Benchmark MA.A.1.2.2: The student understands the relative size of whole numbers, commonly used fractions, decimals, and percents.

Grade Level Expectations
The student:

Third

1. uses language and symbols (>, <, =) to compare the relative size of numbers in the same form.
2. compares and orders whole numbers through hundred thousands or more, using concrete materials, number lines, drawings, and numerals.

3. compares and orders commonly used fractions, including halves, thirds, fourths, fifths, sixths and eighths, using concrete materials.

Fourth

1. uses language and symbols (>, <, =) to compare numbers in the same form and in two different forms such as _ < 1.
2. compares and orders whole numbers through millions or more, using concrete materials, number lines, drawings, and numerals.
3. compares and orders commonly used fractions and decimals to hundredths using concrete materials, drawings, and numerals.
4. locates whole numbers, fractions, mixed numbers, and decimals on a number line.

Fifth

1. uses symbols (>, <, =) to compare numbers in the same and different forms such as 0.5 < 3/4.
2. compares and orders whole numbers using concrete materials, number lines, drawings, and numerals.
3. compares and orders commonly used fractions, percents, and decimals to thousandths using concrete materials, number lines, drawings, and numerals.
4. locates whole numbers, fractions, mixed numbers, and decimals on the same number line.

Benchmark MA.A.1.2.3: The student understands concrete and symbolic representations of whole numbers, fractions, decimals, and percents in real-world situations.

Grade Level Expectations
The student:

Third

1. translates problem situations into diagrams and models using whole numbers, fractions, and decimal notation in the context of money.

Fourth

1. translates problem situations into diagrams and models using whole numbers, fractions, mixed numbers and decimals to hundredths including money notation.

Fifth

1. translates problem situations into diagrams, models, and numerals using whole numbers, fractions, mixed numbers, decimals, and percents.

Benchmark MA.A.1.2.4: The student understands that numbers can be represented in a variety of equivalent forms using whole numbers, decimals, fractions, and percents.

Grade Level Expectations
The student:

Third

1. uses concrete materials to model equivalent forms of whole numbers and common fractions.
2. identifies equivalent forms of numbers.
3. knows that two numbers in different forms are equivalent or non-equivalent, using whole numbers, fractions, and decimals in the context of money.

Fourth

1. uses concrete materials to model equivalent forms of whole numbers, fractions, and decimals.
2. identifies equivalent forms of numbers.
3. knows that two numbers in different forms are equivalent or non-equivalent, using whole numbers, decimals, fractions, and mixed numbers.

Fifth

1. knows that numbers in different forms are equivalent or nonequivalent, using whole numbers, decimals, fractions, mixed numbers, and percents.

Standard 2: The student understands number systems.

Benchmark MA.A.2.2.1: The student uses place-value concepts of grouping based upon powers of ten (thousandths, hundredths, tenths, ones, tens, hundreds, thousands) within the decimal number system.

Grade Level Expectations
The student:

Third

1. knows the value of a given digit in whole numbers to hundred thousands, including writing and interpreting expanded forms of numbers.
2. knows that the value of each place is 10 times that of the place to its right (for example, 1,000 = 10 x 100).

Fourth

1. knows the value of a given digit in numbers from hundredths to millions, including writing and interpreting expanded forms of numbers.

Fifth

1. knows that place value relates to powers of 10.
2. expresses numbers to millions or more in expanded form using powers of ten, with or without exponential notation.

Benchmark MA.A.2.2.2: The student recognizes and compares the decimal number system to the structure of other number systems such as the Roman numeral system or bases other than ten.

Grade Level Expectations
The student:

Third

1. compares the decimal (base 10) number system to the Roman numeral system using the Roman numerals I, V, X, L, and C.

Fourth

1. uses concrete materials and symbolic notation to represent numbers in bases other than base ten, such as base five.
2. reads, writes, and compares the decimal number system to the Roman numeral system using the Roman numerals I, V, X, L, C, D, and M.

Fifth

1. explains the similarities and differences between the decimal (base 10) number system and other number systems that do or do not use place value.

Standard 3: The student understands the effects of operations on numbers and the relationship among these operations, selects appropriate operations, and computes for problem solving.

Benchmark MA.A.3.2.1: The student understands and explains the effects of addition, subtraction, and multiplication on whole numbers, decimals, and fractions, including mixed numbers, and the effects of division on whole numbers, including the inverse relationship of multiplication and division.

Grade Level Expectations
The student:

Third

1. explains and demonstrates the addition and subtraction of whole numbers (up to three digits or more) using concrete materials, drawings, symbols, and algorithms.
2. explains the inverse relationship of addition and subtraction and demonstrates that relationship by writing related fact families.
3. explains and demonstrates the meaning of multiplication (for the repeated addition, array, and area models) using manipulatives, drawings, number sentences, and story problems.

4. explains and demonstrates the meaning of division and of remainders (for the repeated subtraction and partitive models) using manipulatives, drawings, number sentences, and story problems.
5. solves multiplication basic facts using various strategies including the following:
   - modeling with concrete objects or drawings
   - skip counting, for example, to find 4 x 5, count 5, 10, 15, 20
   - using doubles and near doubles, such as 3 x 8 = (2 x 8) + 8
   - applying the commutative property of multiplication, such as 7 x 3 = 3 x 7
   - applying the distributive property of multiplication, such as 8 x 7 = (8 x 5) + (8 x 2)
   - noting and applying patterns in the "facts tables," such as the regularity in the "nines"
   - using the zero and identity properties of multiplication
6. explains the inverse relationship of multiplication and division and writes related fact families.
7. predicts the relative size of solutions in addition, subtraction, multiplication, and division of whole numbers (for example, dividing a whole number by a smaller whole number results in another number that is smaller than the original number).

Fourth

1. recalls (from memory) basic multiplication facts and related division facts.
2. knows the inverse relationship of multiplication and division and demonstrates that relationship by writing related fact families.
3. explains and demonstrates the multiplication and division of whole numbers using manipulatives, drawings, and algorithms.
4. explains and demonstrates the addition and subtraction of common fractions using concrete materials, drawings, story problems, and algorithms.
5. explains and demonstrates the addition and subtraction of decimals (to hundredths) using concrete materials, drawings, story problems, and algorithms.
6. knows the properties of numbers including the following:
   - the identity, commutative, and associative properties of addition
   - the zero and identity properties of multiplication
   - the commutative, associative, and distributive properties of multiplication.
7. predicts the relative size of solutions in the following:
   - addition, subtraction, multiplication, and division of whole numbers
   - addition and subtraction of common fractions
   - addition and subtraction of decimals to hundredths

Fifth

1. explains and demonstrates the multiplication of common fractions using concrete materials, drawings, story problems, symbols, and algorithms.
2. explains and demonstrates the multiplication of decimals to hundredths using concrete materials, drawings, story problems, symbols, and algorithms.
3. predicts the relative size of solutions in the following:
   - addition, subtraction, multiplication, and division of whole numbers
   - addition, subtraction, and multiplication of fractions, decimals, and mixed numbers, with particular attention given to fraction and decimal multiplication (for example, when two numbers less than one are multiplied, the result is a number less than either factor)
4. explains and demonstrates the inverse nature of multiplication and division, with particular attention to multiplication by a fraction (for example, multiplying by _ yields the same result as dividing by 4).
5. explains and demonstrates the commutative, associative, and distributive properties of multiplication.

Benchmark MA.A.3.2.2: The student selects the appropriate operation to solve specific problems involving addition, subtraction, and multiplication of whole numbers, decimals, and fractions, and division of whole numbers.

Grade Level Expectations
The student:

Third

1. writes number sentences for given situations involving the addition, subtraction, multiplication, and division of whole numbers.
2. uses problem-solving strategies to determine the operation needed to solve one-step problems involving addition, subtraction, multiplication, and division of whole numbers.

Fourth

1. uses problem-solving strategies to determine the operation(s) needed to solve one- and two-step problems involving addition, subtraction, multiplication, and division of whole numbers, and addition and subtraction of decimals and fractions.

Fifth

1. uses problem-solving strategies to determine the operation(s) needed to solve one- and two-step problems involving addition, subtraction, multiplication, and division of whole numbers, and addition, subtraction, and multiplication of decimals and fractions.

Benchmark MA.A.3.2.3: The student adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.

Grade Level Expectations
The student:

Third

1. solves real-world problems involving addition, subtraction, multiplication, and division of whole numbers using an appropriate method (for example, mental math, paper and pencil, concrete materials, calculator).
2. explains the reason for choosing a particular computing method for a particular problem.
3. solves real-world multiplication problems with whole numbers (two digits by one digit) using concrete materials, drawings, and paper and pencil.
4. solves real-world division problems having divisors of one digit, dividends not exceeding two digits, with or without remainders.

Fourth

1. solves real-world problems involving addition, subtraction, multiplication, and division of whole numbers, and addition and subtraction of decimals and fractions using an appropriate method (for example, mental math, pencil and paper, calculator).
2. explains the reason for choosing a particular computing method for a particular problem.
3. solves real-world multiplication problems with whole numbers (three digits by one digit) using concrete materials, drawings, and pencil and paper.
4. solves real-world division problems having divisors of one digit and dividends of three digits, with or without remainders.
5. solves real-world problems involving the addition or subtraction of decimals (to hundredths) or common fractions with like or unlike denominators.

Fifth

1. solves real-world problems involving addition, subtraction, multiplication, and division of whole numbers, and addition, subtraction, and multiplication of decimals, fractions, and mixed numbers using an appropriate method (for example, mental math, pencil and paper, calculator).

Standard 4: The student uses estimation in problem solving and computation.

Benchmark MA.A.4.2.1: The student uses and justifies different estimation strategies in a real-world problem situation and determines the reasonableness of results of calculations in a given problem situation.

Grade Level Expectations
The student:

Third

1. uses estimation strategies to determine a reasonable estimate of a quantity.
2. estimates quantities of objects to 250 or more (for example, using a benchmark or reference set of fewer objects).
3. chooses estimation strategies (for example, front-end, rounding) in real-world problem situations and explains the choice.

Fourth

1. chooses, describes and explains estimation strategies used to determine the reasonableness of solutions to real-world problems.
2. estimates quantities of objects to 500 or more and justifies and explains the reasoning for the estimates (for example, using compatible numbers, benchmark numbers, unitizing).

Fifth

1. chooses, describes, and explains estimation strategies used to determine the reasonableness of solutions to real-world problems.
2. estimates quantities of objects to 1000 or more and justifies and explains the reasoning for the estimate (for example, using benchmark numbers, unitizing).

Standard 5: The student understands and applies theories related to numbers.

Benchmark MA.A.5.2.1: The student understands and applies basic number theory concepts, including primes, composites, factors, and multiples.

Grade Level Expectations
The student:

Third

1. knows multiples of whole numbers (with products to 60 or more).
2. uses a model to determine factors of whole numbers through 100 (for example, array).
3. uses tables and charts to determine multiples of whole numbers 1-10 (for example, hundred chart, calendar).

Fourth

1. knows factors and multiples of numbers to 100.
2. multiplies by 10, 100, and 1,000 recognizing and demonstrating patterns.
3. knows rules of divisibility for 2, 3, 5, 9, and 10.
4. uses models to identify perfect squares to 100.

Fifth

1. finds factors of numbers to 100 to determine if they are prime or composite.
2. expresses a whole number as a product of its prime factors.
3. determines the greatest common factor of two numbers.
4. determines the least common multiple of two numbers up to 100 or more.
5. multiplies by powers of 10 (100, 1,000, and 10,000) demonstrating patterns.
6. identifies and applies rules of divisibility for 2, 3, 4, 5, 6, 9, and 10.
7. uses models to identify perfect squares to 144.

Strand B: Measurement
Standard 1: The student measures quantities in the real world and uses the measures to solve problems.

Benchmark MA.B.1.2.1: The student uses concrete and graphic models to develop procedures for solving problems related to measurement including length, weight, time, temperature, perimeter, area, volume, and angle.

Grade Level Expectations
The student:

Third

1. knows measurement concepts and can use oral and written language to communicate them..
2. uses a wide variety of concrete objects to investigate measurement of length, weight, capacity, area, perimeter, and volume (for example, cubes, grid paper, string, squares).
3. knows about measurement of time including using A.M. and P.M., clocks and calendars.
4. knows temperature scales and uses thermometers.
5. knows right angles (90°).

Fourth

1. knows measurement concepts and can use oral and written language to communicate them.
2. uses a wide variety of models (for example, manipulatives, diagrams) and applies counting procedures to investigate measurements of length, area, volume, and perimeter.

3. knows about varied time intervals, including decades, hours, minutes, and seconds.
4. investigates angle measures using models and manipulatives for the common angles of 45°, 90°, and 180° (straight angle) and uses these angles as reference points for measures of other angles.

Fifth

1. knows measurement concepts and can use oral and written language to communicate them.
2. extends conceptual experiences into patterns to develop formulas for determining perimeter, area, and volume.
3. knows varied units of time that include centuries and seconds.
4. classifies angle measures as acute, obtuse, right, or straight.
5. investigates measures of circumference using concrete materials (for example, uses string or measuring tape to measure the circumference of cans or bottles).

Benchmark MA.B.1.2.2: The student solves real-world problems involving length, weight, perimeter, area, capacity, volume, time, temperature, and angles.

Grade Level Expectations
The student:

Third

1. solves real-world problems involving measurement using concrete and pictorial models for the following:
   - length (for example, half-inch, centimeter)
   - weight (for example, pound, kilogram)
   - time (fifteen-, five-, and one-minute intervals)
   - capacity (for example, cup, liter)
   - temperature (Fahrenheit and Celsius)
   - angles (right)
2. solves real-world problems involving perimeter, area, and volume using concrete materials or graphic models.
3. uses schedules, calendars, and elapsed time in hour intervals to solve real-world problems.

Fourth

1. solves real-world problems involving measurement of the following:
   - length (for example, millimeter, quarter-inch, foot, yard, meter)
   - weight (for example, pounds, ounces, kilograms, grams)
   - capacity (for example, cup, milliliters)
   - temperature (Fahrenheit and Celsius)
   - angles (right and straight)
2. solves real-world problems involving perimeter, area, and volume using concrete, graphic, or pictorial models.

3. uses schedules, calendars, and elapsed time to solve real-world problems.

Fifth

1. solves real-world problems involving measurement of the following:
   - length (for example, eighth-inch, kilometer, mile)
   - weight or mass (for example, milligram, ton)
   - temperature (comparing temperature changes within the same scale using either a Fahrenheit or a Celsius thermometer)
   - angles (acute, obtuse, straight)
2. solves real-world problems involving perimeter, area, capacity, and volume using concrete, graphic or pictorial models.
3. uses schedules, calendars, and elapsed time to solve real-world problems.

Standard 2: The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).

Benchmark MA.B.2.2.1: The student uses direct (measured) and indirect (not measured) measures to calculate and compare measurable characteristics.

Grade Level Expectations
The student:

Third

1. calculates and compares measurable characteristics using manipulatives (for example, creates a meter using centimeter cubes).
2. devises nonstandard, indirect ways to compare lengths that cannot be physically compared (side-by-side) (for example, uses string to compare the lengths of crooked paths).
3. uses customary and metric units to compare length, weight, and capacity.

Fourth

1. devises nonstandard, indirect ways to compare lengths (for example, compare the height of a cylinder to the distance around it).
2. uses customary and metric units to compare length, weight, and capacity or volume.
3. uses multiplication or division to convert units of measure within either the customary or metric system (for example: 100 cm = 1 m).

Fifth

1. finds the length or height of “hard-to-reach” objects by using the measure of a portion of the objects (for example, find the height of a room or building by finding the height of one block or floor and multiplying by the number of blocks or floors).
2. uses customary and metric units to compare length, weight or mass, and capacity or volume.

3. uses multiplication and division to convert units of measure within the customary or metric system.

Benchmark MA.B.2.2.2: The student selects and uses appropriate standard and nonstandard units of measurement, according to type and size.

Grade Level Expectations
The student:

Third

1. knows an appropriate unit of measure to determine the dimension(s) of a given object (for example, standard - student chooses centimeters instead of meters to measure a pencil; nonstandard - student chooses a paper clip instead of his or her hand to measure a pencil).
2. knows an appropriate unit of measure (standard or nonstandard) to measure weight and capacity.

Fourth

1. knows an appropriate unit of measure to determine the dimension(s) of a given object (for example, standard - student chooses feet or inches instead of yards to measure a classroom desk; nonstandard - student chooses a pencil or his or her hand to measure a classroom desk).
2. knows an appropriate unit of measure (standard or nonstandard) to measure weight and capacity.

Fifth

1. knows an appropriate unit of measure to determine the dimension(s) of a given object (for example, standard - student chooses feet or yards instead of inches to measure a room; nonstandard - student chooses a length of yarn instead of a pencil to measure a room).
2. knows an appropriate unit of measure (standard or nonstandard) to measure weight, mass, and capacity.

Standard 3: The student estimates measurements in real-world problem situations.

Benchmark MA.B.3.2.1: The student solves real-world problems involving estimates of measurements, including length, time, weight, temperature, money, perimeter, area, and volume.

Grade Level Expectations
The student:

Third

1. knows how to determine whether an accurate or estimated measurement is needed for a solution.
2. using real-world settings, objects, graph paper, or charts, solves problems involving estimated measurements including the following:

- length to nearest inch, centimeter
- weight to nearest pound, kilogram
- time to nearest half-hour interval
- temperature to nearest five-degree interval
- money to nearest $1 or $10 (combination of coin and currency)

3. knows how to estimate the area and perimeter of square and rectangular shapes using graph paper, geoboard or other manipulatives.
4. knows how to estimate the volume of a rectangular prism using manipulatives.

Fourth

1. knows how to determine whether an accurate or estimated measurement is needed for a solution.
2. using real-world settings, objects, graph paper, or charts, solves problems involving estimated measurements, including the following:
   - length to nearest half-inch, centimeter
   - weight to nearest ounce, gram
   - time to nearest five-minute interval
   - temperature to nearest five-degree interval
   - money to nearest $1.00 (combination of coin and currency)
3. knows how to estimate the area and perimeter of regular and irregular polygons using graph paper, geoboard, or other objects.
4. knows how to estimate the volume of a rectangular prism using manipulatives or graphic representation.

Fifth

1. knows how to determine whether an accurate or estimated measurement is needed for a solution.
2. solves real-world problems involving estimated measurements, including the following:
   - length to nearest quarter-inch, centimeter
   - weight to nearest ounce, gram
   - time to nearest one-minute interval
   - temperature to nearest five-degree interval
   - money to nearest $1.00
3. knows how to estimate the area and perimeter of regular and irregular polygons.
4. knows how to estimate the volume of a rectangular prism.

Standard 4: The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations.

Benchmark MA.B.4.2.1: The student determines which units of measurement, such as seconds, square inches, dollars per tankful, to use with answers to real-world problems.

Grade Level Expectations
The student:

Third

1. selects an appropriate measurement unit for labeling the solution to real-world problems.

Fourth

1. selects an appropriate measurement unit for labeling the solution to real-world problems.

Fifth

1. selects an appropriate measurement unit for labeling the solution to real-world problems.

Benchmark MA.B.4.2.2: The student selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

Grade Level Expectations
The student:

Third

1. selects and uses the appropriate tool for situational measures (for example, measuring sticks, scales and balances, thermometers, measuring cups).

Fourth

1. selects and uses the appropriate tool for situational measures (for example, measuring sticks, scales and balances, thermometers, measuring cups, gauges).

Fifth

1. selects and uses the appropriate tool for situational measures (for example, measuring sticks, scales and balances, thermometer, measuring cups, gauges, protractors).

Strand C: Geometry and Spatial Sense
Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.

Benchmark MA.C.1.2.1: The student given a verbal description, draws and/or models two- and three-dimensional shapes and uses appropriate geometric vocabulary to write a description of a figure or a picture composed of geometric figures.

Grade Level Expectations
The student:

Third

1. uses appropriate geometric vocabulary to describe two- and three-dimensional figures (for example, parallel and perpendicular lines, quadrilateral, right angle).
2. draws and classifies two-dimensional figures having up to six or more sides.
3. uses appropriate geometric vocabulary to describe properties of two-dimensional figures.

Fourth

1. uses appropriate geometric vocabulary to describe properties and attributes of two- and three-dimensional figures (for example, faces, edges, vertices, diameter).
2. draws and classifies two-dimensional figures having up to eight or more sides.

Fifth

1. uses appropriate geometric vocabulary to describe properties and attributes of two- and three-dimensional figures (for example, obtuse and acute angles; radius; equilateral, scalene, and isosceles triangles.).
2. draws and classifies two-dimensional figures having up to ten or more sides and three-dimensional figures (for example, cubes, rectangular prisms, pyramids).
3. knows the characteristics of and relationships among points, lines, line segments, rays, and planes.

Standard 2: The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed.

Benchmark MA.C.2.2.1: The student understands the concepts of spatial relationships, symmetry, reflections, congruency, and similarity.

Grade Level Expectations
The student:

Third

1. uses manipulatives to solve problems requiring spatial visualization.
2. knows symmetry, congruency, and reflections in geometric figures using concrete materials (for example, pattern blocks, geoboards, mirrors).
3. knows congruent and similar figures.

Fourth

1. uses manipulatives to solve problems requiring spatial visualization.

2. knows symmetry, congruency, and reflections in geometric figures using drawings and concrete materials (for example, pattern blocks, mirrors).
3. knows and creates congruent and similar figures.

Fifth

1. uses manipulatives to solve problems requiring spatial visualization.
2. knows symmetry, congruency, and reflections in geometric figures.
3. knows how to justify that two figures are similar or congruent.

Benchmark MA.C.2.2.2: The student predicts, illustrates, and verifies which figures could result from a flip, slide, or turn of a given figure.

Grade Level Expectations
The student:

Third

1. explores flips, slides, and 180^o turns (either clockwise or counterclockwise) using concrete and graphic materials (for example, pattern blocks, geoboards, dot paper).
2. knows the effect of a flip, slide, and 180^o turn on a geometric figure.
3. explores tessellations.

Fourth

1. identifies and performs flips, slides, and turns given angle (90^o, 180^o) and direction (clockwise or counterclockwise) of turn, using concrete and graphic materials (for example, pattern blocks, geoboards, grid paper).
2. knows the effect of a flip, slide, or turn (90^o, 180^o) on a geometric figure.
3. explores tessellations.

Fifth

1. identifies and performs flips, slides, and turns given angle (90^o, 180^o, 270^o) and direction (clockwise or counterclockwise) of turn.
2. knows the effect of a flip, slide or turn (90^o, 180^o, 270^o) on a geometric figure.
3. explores tessellations.

Standard 3: The student uses coordinate geometry to locate objects in both two and three dimensions and to describe objects algebraically.

Benchmark MA.C.3.2.1: The student represents and applies a variety of strategies and geometric properties and formulas for two- and three-dimensional shapes to solve real-world and mathematical problems.

Grade Level Expectations
The student:

Third

1. compares the concepts of area and perimeter through the use of concrete and graphic materials (for example, geoboards, color tiles, grid paper).
2. applies the concepts of area and perimeter of rectangles to solve real-world and mathematical problems through the use of concrete materials (for example, framing a photograph).

Fourth

1. compares the concepts of area and perimeter using concrete materials (for example, color tiles, grid paper) and real-world situations (for example, carpeting a floor, fencing a yard).
2. applies the concepts of area and perimeter to solve real-world and mathematical problems.
3. knows how area and perimeter are affected when geometric figures are combined.

Fifth

1. compares the concepts of area, perimeter, and volume using concrete materials (for example, geoboards, grid paper) and real-world situations (for example, tiling a floor, bordering a room, packing a box).
2. applies the concepts of area, perimeter, and volume to solve real-world and mathematical problems using student-developed formulas.
3. knows how area and perimeter are affected when geometric figures are combined, rearranged, enlarged, or reduced (for example, What happens to the area of a square when the sides are doubled?).

Benchmark MA.C.3.2.2: The student identifies and plots positive ordered pairs (whole numbers) in a rectangular coordinate system (graph).

Grade Level Expectations
The student:

Third

1. knows how to identify, locate, and plot ordered pairs of whole numbers on a graph.

Fourth

1. knows how to identify, locate, and plot ordered pairs of whole numbers on a graph or on the first quadrant of a coordinate system.

Fifth

1. knows how to identify, locate, and plot ordered pairs of whole numbers on a graph or on the first quadrant of a coordinate system.

Strand D: Algebraic Thinking
Standard 1: The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions.

Benchmark MA.D.1.2.1: The student describes a wide variety of patterns and relationships through models, such as manipulatives, tables, graphs, rules using algebraic symbols.

Grade Level Expectations
The student:

Third

1. identifies missing parts in patterns.
2. describes, extends, and creates numerical and geometric patterns through models (for example, concrete objects, drawings, simple number sequences).
3. poses and solves problems by identifying a predictable visual or numerical pattern (for example: Continue this pattern: + , - , = , + , + , - , - ,___ , ___, …).

Fourth

1. describes, extends, and creates numerical and geometric patterns using a variety of models (for example, lists, tables, charts).
2. poses, solves, and explains problems by identifying a predictable visual or numerical pattern such as:

Input	1	2	3	7
Output	$3	$6	$9	?

Fifth

1. describes, extends, creates, predicts, and generalizes numerical and geometric patterns using a variety of models (for example, lists, tables, graphs, charts, diagrams, calendar math).
2. poses and solves problems by identifying a predictable visual or numerical pattern such as:

Day	1	2	3	4	…	*n*
Number of Calls	4	7	10	?		?

3. explains and expresses numerical relationships and pattern generalizations, using algebraic symbols (for example, in the problem above, the number of calls on the *n*th day can be expressed as 3*n*+1).

Benchmark MA.D.1.2.2: The student generalizes a pattern, relation, or function to explain how a change in one quantity results in a change in another.

Grade Level Expectations
The student:

Third

1. knows mathematical relationships in patterns (for example, the second number is two more than the first).
2. analyzes number patterns and states the rule for relationships (for example, 2, 4, 6, 8, …; the rule: +2).
3. discusses and explains the choice of the rule that applies to the pattern.
4. identifies and extends a pattern according to the given rule.
5. applies and explains the appropriate rule to complete a table or chart (for example, in the following table, the rule is "multiply by 6"):

1	2	3	4
6	12	?	24

Fourth

1. knows mathematical relationships in patterns (for example, the second shape is the first shape turned 90^{o}).
2. analyzes number patterns and states rules for relationships (for example, 2, 4, 7, 9, 12, …; the rule is: +2, +3, +2, +3, …).
3. discusses, explains, and analyzes the rule that applies to the pattern.
4. applies the appropriate rule to complete a table or a chart such as:

Input	Output
2	8
9	36
?	16
7	28

Fifth

1. knows mathematical relationships in patterns (for example, Fibonacci numbers: 1, 1, 2, 3, 5, 8,…).
2. analyzes and generalizes number patterns and states the rule for relationships (for example, 1, 4, 9, 16, …; the rule: +3, +5, +7, …; or "squares of the whole numbers").
3. applies the appropriate rule to complete a table or a chart, such as:

IN	1	2	3	9
OUT	1	4	9	?

Standard 2: The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.

Benchmark MA.D.2.2.1: The student represents a given simple problem situation using diagrams, models, and symbolic expressions translated from verbal phrases, or verbal phrases translated from symbolic expressions, etc.

Grade Level Expectations
The student:

Third

1. uses concrete materials to model and solve a number sentence with a missing addend for simple word problems (for example, $13 + r = 15$).
2. creates a simple word problem for a given number sentence, diagram, or model.
3. knows that an equation is a number sentence stating that two quantities are equal (for example, identifies and provides examples and non-examples of equations).

Fourth

1. solves problems involving equations or simple inequalities using manipulatives, diagrams, or models, symbolic expressions, or written phrases.
2. uses a variable to represent a given verbal expression (for example, seven times a number is $7n$).
3. translates problem-solving situations into expressions and equations using a variable for the unknown.

Fifth

1. solves problems involving simple equations or inequalities using diagrams or models, symbolic expressions, or written phrases.
2. uses a variable to represent a given verbal expression (for example, 5 more than a number is $n + 5$).
3. translates equations into verbal and written problem situations.

Benchmark MA.D.2.2.2: The student uses informal methods, such as physical models and graphs to solve real-world problems involving equations and inequalities.

Grade Level Expectations
The student:

Third

1. uses physical models and graphs (for example, cubes, number lines) to solve real-world equations and inequalities.
2. uses information from physical models and graphs to solve problems.

Fourth

1. uses physical or pictorial models and graphs (for example, cubes, number lines) to solve equations or inequalities.

2. uses information from physical models, graphs, or tables to solve problems.

Fifth

1. uses concrete or pictorial models and graphs (for example, drawings, number lines) to solve equations or inequalities.
2. uses information from concrete or pictorial models or graphs to solve problems.

Strand E: Data Analysis and Probability
Standard 1: The student understands and uses the tools of data analysis for managing information.

Benchmark MA.E.1.2.1: The student solves problems by generating, collecting, organizing, displaying, and analyzing data using histograms, bar graphs, circle graphs, line graphs, pictographs, and charts.

Grade Level Expectations
The student:

Third

1. identifies different parts of a graph (for example, titles, labels, key).
2. interprets and compares information from picto- and bar graphs including graphs from content-area materials and periodicals.
3. generates questions, collects responses, and displays data in a table, pictograph or bar graph.
4. interprets and explains orally and in writing displays of data.

Fourth

1. knows the purpose of different parts of a graph (for example, titles, labels, intervals, key).
2. chooses reasonable titles and labels for graphs.
3. interprets and compares information from different types of graphs including graphs from content-area materials and periodicals.
4. generates questions, collects responses, and displays data on a pictograph, circle graph, bar, double bar, or line graph.
5. interprets and completes circle graphs using common fractions.
6. analyzes and explains orally or in writing the implications of data displays.

Fifth

1. knows which types of graphs are appropriate for different kinds of data (for example, bar graphs, line, or circle graphs).
2. interprets and compares information from different types of graphs including graphs from content-area materials and periodicals.

3. chooses reasonable titles, labels, scales and intervals for organizing data on graphs.
4. generates questions, collects responses, and displays data on a graph.
5. interprets and completes circle graphs using common fractions or percents.
6. analyzes and explains orally or in writing the implications of graphed data.

Benchmark MA.E.1.2.2: The student determines range, mean, median, and mode from sets of data.

Grade Level Expectations
The student:

Third

1. uses concrete materials to determine the mean in a set.
2. identifies the median and mode from a set of numerical data.
3. identifies the range in a set of numerical data.
4. uses concrete materials, pictures, or graphs to display data and identify range, median, and mode.

Fourth

1. identifies the mean, median and mode from a set of data.
2. identifies the range on a line graph.

Fifth

1. uses a stem-and-leaf plot from a set of data to identify the range, median, mean, and mode.
2. uses range and measures of central tendency in real-world situations.

Benchmark MA.E.1.2.3: The student analyzes real-world data to recognize patterns and relationships of the measures of central tendency using tables, charts, histograms, bar graphs, line graphs, pictographs, and circle graphs generated by appropriate technology, including calculators and computers.

Grade Level Expectations
The student:

Third

1. uses a calculator to compare data.
2. in class projects, constructs and discusses patterns in computer-generated graphs using real-world problems (for example, identify most popular pizza topping).

Fourth

1. uses a calculator to determine the range and mean of a set of data.

2. uses computer applications to examine and evaluate data.
3. uses computer applications to construct graphs.

Fifth

1. uses a calculator to determine the range and mean of a set of data.
2. uses computer applications to examine and evaluate data.
3. uses computer applications to construct labeled graphs.
4. uses computer-generated spreadsheets to record and display real-world data.

Standard 2: The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.

Benchmark MA.E.2.2.1: The student uses models, such as tree diagrams, to display possible outcomes and to predict events.

Grade Level Expectations
The student:

Third

1. determines the number of possible combinations of given items and displays them in an organized way (for example, lists all possible combinations of three shirts and two pairs of shorts).
2. represents all possible outcomes for a particular probability situation or event using models such as charts or lists.
3. calculates the probability of a particular event occurring from a set of all possible outcomes.

Fourth

1. determines the number of possible combinations of given items and displays them in an organized way.
2. represents all possible outcomes for a simple probability situation or event using models such as organized lists, charts, or tree diagrams.
3. calculates the probability of a particular event occurring from a set of all possible outcomes.

Fifth

1. determines the number of possible combinations of given items and displays them in an organized way.
2. represents all possible outcomes for a simple probability situation or event using models such as organized lists, charts, or tree diagrams.
3. calculates the probability of a particular event occurring from a set of all possible outcomes.

Benchmark MA.E.2.2.2: The student predicts the likelihood of simple events occurring.

Grade Level Expectations
The student:

Third

1. identifies and records the possible outcomes of simple experiments using concrete materials (for example, spinners, marbles in a bag, coin toss).
2. determines which outcomes are most likely to occur in certain situations (for example, spinning red is most likely to occur when a spinner is divided equally among red, blue, green, and red).

Fourth

1. identifies and records using common fractions, the possible outcomes of simple experiments using concrete materials (for example, spinners, number cubes, coin toss).
2. determines and predicts which outcomes are likely to occur and expresses those expected outcomes as fractions.
3. conducts experiments to test predictions.

Fifth

1. identifies and records the possible outcomes of an experiment using concrete materials (for example, spinners, marbles, number cubes).
2. explains and predicts which outcomes are most likely to occur and expresses the probabilities as fractions.
3. conducts experiments to test predictions.

Standard 3: The student uses statistical methods to make inferences and valid arguments about real-world situations.

Benchmark MA.E.3.2.1: The student designs experiments to answer class or personal questions, collects information, and interprets the results using statistics (range, mean, median, and mode) and pictographs, charts, bar graphs, circle graphs, and line graphs.

Grade Level Expectations
The student:

Third

1. designs appropriate questions for a survey.
2. creates a pictograph or bar graph to present data from a given survey.
3. explains the results from the data of a given survey.

Fourth

1. designs a class survey to collect data.
2. creates an appropriate graph to display data (for example, pictographs, bar graphs, line graphs, circle graphs).
3. determines appropriate statistical measures for data (range, mean, median, mode).
4. explains the results using statistics (range and measures of central tendency).

Fifth

1. designs a survey to collect data.
2. as a class project, discusses ways to choose a sample representative of a large group such as a sample representative of the entire school.
3. creates an appropriate graph to display data, including titles, labels, scales, and intervals.
4. interprets the results using statistics (range and measures of central tendency).

Benchmark MA.E.3.2.2: The student uses statistical data about life situations to make predictions and justifies reasoning.

Grade Level Expectations
The student:

Third

1. uses statistical data to recognize trends.
2. applies statistical data to make generalizations.
3. explains generalizations.

Fourth

1. uses statistical data to identify trends.
2. applies statistical data to make generalizations.
3. justifies and explains generalizations.

Fifth

1. uses statistical data to predict trends.
2. applies statistical data to make generalizations.
3. justifies and explains generalizations.