

Grade Level Expectations for the Sunshine State Standards

Mathematics Grades 6-8



FLORIDA DEPARTMENT OF EDUCATION

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Sunshine State Standards
Grade Level Expectations
Mathematics 6-8

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.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.

Grade Level Expectations

The student:

Sixth

1. knows word names and standard numerals for whole numbers, fractions, decimals (through hundred-thousandths), and percents.
2. reads and writes whole numbers and decimals in expanded form.

Seventh

1. knows word names and standard numerals for integers, fractions, decimals, ratios, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, and numbers expressed using the square root radical.
2. reads and writes whole numbers and decimals in expanded form, including exponential notation.

Eighth

1. knows word names and standard numerals for integers, fractions, decimals, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, absolute value, radicals, and ratios.

Benchmark MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.

Grade Level Expectations

The student:

Sixth

1. compares and orders fractions and decimals using graphic models, number lines, and symbols.
2. compares and orders fractions, decimals, and common percents.

Seventh

1. compares and orders integers, fractions, decimals, numbers with exponents, and numbers expressed as percents or in scientific notation, including ordering on a number line.

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Eighth

1. compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols.
2. compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.

Benchmark MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.

Grade Level Expectations

The student:

Sixth

1. knows examples of positive rational numbers in real-world situations.
2. describes the meanings of positive rational numbers using part/whole relationships and relative size comparisons in real-world situations.
3. constructs models to represent positive rational numbers.

Seventh

1. knows examples of rational and irrational numbers in real-world situations, including the irrational numbers π and $\sqrt{2}$.
2. describes the meanings of rational and irrational numbers using physical or graphical displays.
3. constructs models to represent rational numbers.

Eighth

1. knows examples of rational and irrational numbers in real-world situations.
2. describes the meanings of rational and irrational numbers using physical or graphical displays.
3. constructs models to represent rational and irrational numbers.

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Benchmark MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.

Grade Level Expectations

The student:

Sixth

1. knows the relationships among fractions, decimals, and percents.
2. expresses a given quantity in a variety of ways, such as fractions, decimals, or numbers expressed as percents.
3. knows whether numbers expressed in different forms are equal.
4. converts a number expressed in one form to its equivalent in another form.

Seventh

1. knows the relationships among fractions, decimals, and percents.
2. expresses a given quantity in a variety of ways (for example, integers, fractions, decimals, numbers expressed as a percent, numbers expressed in scientific notation, ratios).
3. knows whether numbers expressed in different forms are equal.
4. converts a number expressed in one form to its equivalent in another form.

Eighth

1. knows the relationships among fractions, decimals, and percents given a real-world context.
2. simplifies expressions using integers, exponents, and radicals.
3. knows equivalent forms of large and small numbers in scientific and standard notation.
4. identifies and explains the absolute value of a number.

Standard 2: The student understands number systems.

Benchmark MA.A.2.3.1: The student understands and uses exponential and scientific notation.

Grade Level Expectations

The student:

Sixth

1. knows the meaning and use of exponential notation (for example $2^3=2 \times 2 \times 2=8$).
2. expresses whole numbers in exponential notation or in factored form.
3. evaluates numerical expressions that contain exponential notation.

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Seventh

1. expresses whole numbers in exponential notation (for example, $36 = 6^2$).
2. evaluates numerical expressions that contain exponential notation.
3. expresses numbers greater than one in scientific notation.
4. expresses numbers in scientific notation as numbers in standard form.

Eighth

1. expresses rational numbers in exponential notation including negative exponents (for example, $2^{-3} = \frac{1}{2^3} = 1/8$).
2. expresses numbers in scientific or standard notation including decimals between 0 and 1.
3. evaluates numerical or algebraic expressions that contain exponential notation.

Benchmark MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.

Grade Level Expectations

The student:

Sixth

1. compares the decimal number system to systems that do not use place value (for example, Roman numeral, ancient Egyptian).

Seventh

1. applies knowledge of the decimal number system and of non-place-value systems.

Eighth

1. expresses base ten numbers as equivalent numbers in different bases, such as base two, base five, and base eight.
2. discusses the application of the binary (base two) number system in computer technology.
3. expresses non-base ten numbers as equivalent numbers in base ten.

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

Benchmark MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.

Grade Level Expectations

The student:

Sixth

1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.
2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division, on whole numbers, decimals, fractions, and mixed numbers.
3. knows and applies the commutative, associative, and distributive properties in the addition and multiplication of rational numbers.
4. uses concrete models and real-world examples to explore the inverse relationship of positive and negative numbers.

Seventh

1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, and decimals.
2. uses models or pictures to show the effects of addition, subtraction, multiplication, and division on whole numbers, decimals, fractions, mixed numbers, and integers.
3. applies the properties of rational numbers to solve problems (commutative, associative, distributive, identity, equality, inverse).
4. knows the inverse relationship of positive and negative numbers.

Eighth

1. knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, decimals, and integers.
2. knows the inverse relationship of positive and negative numbers.
3. applies the properties of real numbers to solve problems (commutative, associative, distributive, identity, equality, inverse, and closure).

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Benchmark MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.

Grade Level Expectations

The student:

Sixth

1. knows the appropriate operations to solve real-world problems involving whole numbers, decimals, and fractions.
2. solves real-world problems involving whole numbers, fractions, decimals, and common percents using one or two-step problems.
3. applies order of operations when solving problems (parentheses, multiplication, division, addition, and subtraction).
4. knows proportional relationships and describes such relationships in words, tables, or graphs.

Seventh

1. knows the appropriate operation to solve real-world problems involving fractions, decimals, and integers.
2. solves real-world problems involving decimals and fractions using two- or three-step problems.
3. solves real-world problems involving percents (for example, discounts, simple interest, taxes, tips).
4. applies order of operations to solve problems (parentheses, exponents, multiplication, division, addition, and subtraction).
5. knows proportional relationships and uses tables, graphs, or “constant ratio” relationships to solve and explain problems.

Eighth

1. knows the appropriate operations to solve real-world problems involving integers, ratios, rates, proportions, numbers expressed as percents, decimals, and fractions.
2. solves real-world problems involving integers, ratios, proportions, numbers expressed as percents, decimals, and fractions in two- or three-step problems.
3. solves real-world problems involving percents including percents greater than 100% (for example percent of change, commission).
4. writes and simplifies expressions from real-world situations using the order of operations.

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Benchmark MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed 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:

Sixth

1. solves one- or two-step real-world problems involving whole numbers and decimals using appropriate methods of computation (for example, mental computation, paper and pencil, and calculator).
2. justifies the choice of method for calculations, such as mental computation, concrete materials, algorithms, or calculators.

Seventh

1. solves multi-step real-world problems involving whole numbers, fractions or decimals using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.

Eighth

1. solves multi-step real-world problems involving fractions, decimals, and integers using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.

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

Benchmark MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.

Grade Level Expectations

The student:

Sixth

1. knows an appropriate estimation technique for a given situation using whole numbers (for example, clustering, compatible number, front-end).
2. estimates to predict results and to check reasonableness of results.
3. determines whether an exact answer is needed or an estimate would be sufficient.

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Seventh

1. knows an appropriate estimation technique for a given situation using whole numbers, fractions and decimals.
2. estimates to predict results and check reasonableness of results.
3. determines whether an exact answer is needed or an estimate would be sufficient.

Eighth

1. knows appropriate estimation techniques for a given situation using real numbers.
2. estimates to predict results and to check reasonableness of results.

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

Benchmark MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.

Grade Level Expectations

The student:

Sixth

1. knows if numbers (less than or equal to 100) are prime or composite.
2. finds the greatest common factor and least common multiple of two or more numbers.
3. determines the prime factorization of a number less than or equal to 100.
4. uses divisibility rules.

Seventh

1. knows if numbers are prime or composite.
2. finds the greatest common factor and least common multiple of two or more numbers.
3. determines the prime factorization of a composite number.
4. applies number theory concepts to determine the terms in a sequence.
5. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.

Eighth

1. knows if numbers are relatively prime.
2. applies number theory concepts to determine the terms in a real number sequence.
3. applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.

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Strand B: Measurement

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

Benchmark MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.

Grade Level Expectations

The student:

Sixth

1. uses concrete and graphic models to create formulas for finding the perimeter and area of plane figures and the volume of rectangular solids.
2. uses concrete and graphic models to discover an approximation for π and creates a formula for finding circumference.

Seventh

1. uses concrete or graphic models to create formulas for finding volumes of solids (prisms and cylinders).
2. uses concrete or graphic models to create formulas for finding surface area of prisms and cylinders.
3. solves and explains problems involving perimeter, area, and circumference.

Eighth

1. uses concrete and graphic models to explore and derive formulas for surface area and volume of three-dimensional regular shapes, including pyramids, prisms, and cones.
2. solves and explains real-world problems involving surface area and volume of three-dimensional shapes.

Benchmark MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.

Grade Level Expectations

The student:

Sixth

1. identifies a protractor as a tool for measuring angles and measures angles using a protractor.
2. identifies and names angles according to their measure (including acute, right, obtuse, straight).

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3. classifies triangles according to the measurement of their angles and according to the length of their sides.
4. determines the measure of a missing angle using angle relationships.

Seventh

1. finds the measure of an angle by measuring with a protractor or applying angle relationships (for example, corresponding, complementary, supplementary, interior, exterior).
2. develops and uses the distance formula in solving real-world problems ($d = rt$).

Eighth

1. applies formulas for finding rates, distance, time and angle measures.
2. describes and uses rates of change (for example, temperature as it changes throughout the day, or speed as the rate of change in distance over time) and other derived measures.

Benchmark MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.

Grade Level Expectations

The student:

Sixth

1. given a two-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.
2. knows the relationship between the area or perimeter of an original figure and that of a newly created figure.
3. solves real-world or mathematical problems involving perimeter or area and how these are affected by changes in the dimensions of the figure.

Seventh

1. given a two- or three-dimensional figure, creates a new figure by increasing or decreasing the original dimensions.
2. knows the relationships between the perimeters, areas, surface areas, or volumes of the original figure and those of the newly created figure.
3. solves real world or mathematical problems involving perimeter, area, circumference, surface area and volume and how these are affected by changes in the dimensions of the figures.

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Eighth

1. knows how a change in a figure's dimensions affects its perimeter, area, circumference, surface area, or volume.
2. knows how changes in the volume, surface area, area, or perimeter of a figure affect the dimensions of the figure.
3. solves real-world or mathematical problems involving the effects of changes either to the dimensions of a figure or to the volume, surface area, area, perimeter, or circumference of figures.

Benchmark MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.

Grade Level Expectations

The student:

Sixth

1. knows proportional relationships in scale drawings.
2. uses scale drawings to solve real-world problems including distance (as in map reading).

Seventh

1. knows an appropriate scale needed to produce a proportional drawing or model.
2. knows proportional relationships used in scale drawings.
3. produces a scale drawing.

Eighth

1. interprets and applies various scales including those based on number lines, graphs, models, and maps. (Scale may include rational numbers.)
2. constructs and uses scale drawings to recreate a given situation.

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

Benchmark MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.

Grade Level Expectations

The student:

Sixth

1. compares objects according to their length, weight or mass, and capacity using customary or metric units.

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2. measures length, weight or mass, and capacity using appropriate measuring instruments.

Seventh

1. measures length, weight or mass, and capacity or volume using customary or metric units.
2. knows relationships between metric units of mass and capacity (for example, one cubic centimeter of water weighs one gram).
3. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures (for example, using shadow measurement and properties of similar triangles to find the height of a flag pole).

Eighth

1. finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures.

Benchmark MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.

Grade Level Expectations

The student:

Sixth

1. changes one customary or metric unit of measurement to another within the same system.
2. uses concrete manipulatives or constructs models of square units (such as square inch and square meter) for measuring area and cubic units (such as cubic centimeter or cubic yard) for measuring volume.

Seventh

1. compares units of measurement within a system (metric or customary).
2. performs operations on measurements within either the metric or customary system (for example, finds three times 27 inches and expresses the answer in yards).
3. selects the appropriate unit of measurement when solving real-world problems (for example linear, square, and cubic units).
4. solves problems using the metric or customary system involving conversions within the same system.

Eighth

1. solves problems using mixed units within each system, such as feet and inches, hours and minutes.
2. solves problems using the conversion of measurements within the customary system.
3. solves problems using the conversions of measurement within the metric system.

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

Benchmark MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.

Grade Level Expectations

The student:

Sixth

1. estimates the measure (length, weight or mass, and capacity) of an object or figure and then compares the estimate with the actual measurement of the object or figure.
2. knows whether an exact answer is needed or an estimate is sufficient.
3. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary or metric units.
4. estimates solutions to real-world problems involving measurement, including estimates of time, temperature and money.

Seventh

1. knows whether an exact answer is needed or if an estimate is sufficient.
2. estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary and metric units.
3. estimates solutions to real-world problems involving measurement, including estimates of time, temperature, and money.

Eighth

1. knows a variety of strategies to estimate, describe, make comparisons, and solve real-world and mathematical problems involving measurements.

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.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).

Grade Level Expectations

The student:

Sixth

1. selects the appropriate unit of measure for a given real-world situation.
2. knows the approximate nature of measurement and measures to the specified degree of

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accuracy (for example, nearest centimeter or sixteenth of an inch).

Seventh

1. selects appropriate units of measurement in a real-world context.
2. knows that measurements are always approximate and that the degree of accuracy of a measurement depends upon the precision of the instrument.
3. knows the precision of different measuring instruments.
4. determines the appropriate precision unit for a given situation.

Eighth

1. selects the appropriate unit of measure for a given situation.
2. knows the precision of different measuring instruments.
3. determines the appropriate precision unit for a given situation.
4. identifies the number of significant digits as it relates to the least precise unit of measure.
5. determines the greatest possible error of a given measurement and the possible actual measurements of an object.

Benchmark MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.

Grade Level Expectations

The student:

Sixth

1. selects an appropriate measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges).
2. determines the interval of a scale and reads the scales on a variety of measuring instruments.
3. measures accurately with the measurement tools.

Seventh

1. selects a measurement tool (for example, scales, rulers, thermometers, measuring cups, protractors, gauges) appropriate to a given situation.
2. measures accurately with the measurement tools to the specified degree of accuracy for the task and in keeping with the precision of the measurement tool.

Eighth

1. applies significant digits in the real-world context.
2. selects and uses appropriate instruments, technology, and techniques to measure quantities and dimensions to a specified degree of accuracy.

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Strand C: Geometry and Spatial Sense

Standard 1: The student describes, draws, identifies, and analyzes two- and three-dimensional shapes.

Benchmark MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.

Grade Level Expectations

The student:

Sixth

1. identifies, draws, and uses symbolic notation to denote the attributes of two-dimensional geometric figures (including points, parallel and perpendicular lines, planes, rays, and parts of a circle).
2. knows and draws angles (including acute, obtuse, right, and straight).
3. analyzes relationships among two-dimensional geometric figures (for example, the diagonal of a rectangle divides the rectangle into two congruent triangles each having one half the area of the rectangle).
4. uses appropriate measuring devices (including ruler and protractor) as needed in analysis of figures.
5. knows the attributes of and draws three-dimensional figures (including rectangular solids and cylinders).
6. knows the properties of two- and three-dimensional figures.

Seventh

1. identifies, draws, and uses symbolic notation to denote the basic properties of geometric terms including lines (intersecting, skew, parallel, perpendicular) and congruent figures.
2. determines the measure of various types of angles using a protractor or angle relationships (including complementary, supplementary, and vertical angles).
3. compares and describes the attributes of regular and irregular polygons (for example, parallelogram, trapezoid, pentagon, hexagon).
4. identifies and classifies triangles and quadrilaterals.
5. knows the attributes of and draws three-dimensional figures (pyramid, cone, sphere, hemisphere).
6. knows the properties of two- and three-dimensional figures.

Eighth

1. determines and justifies the measures of various types of angles based upon geometric relationships in two- and three-dimensional shapes.
2. compares regular and irregular polygons and two- and three-dimensional shapes.

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3. draws and builds three-dimensional figures from various perspectives (for example, flat patterns, isometric drawings, nets).
4. knows the properties of two- and three-dimensional figures.

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

Benchmark MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.

Grade Level Expectations

The student:

Sixth

1. uses manipulatives and drawings to solve problems requiring spatial visualization.
2. describes and applies the property of symmetry in figures.
3. recognizes and draws congruent and similar figures.
4. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.

Seventh

1. uses manipulatives and drawings to solve problems requiring spatial visualization.
2. describes and applies the properties of parallelism, perpendicularity and symmetry in real-world contexts.
3. recognizes, draws, and describes congruent and similar figures.
4. creates and describes the attributes of a figure either congruent or similar to a given figure.
5. identifies and performs the various transformations (reflection, translation, rotation) of a given figure on a coordinate plane.

Eighth

1. use the properties of parallelism, perpendicularity, and symmetry in solving real-world problems.
2. identifies congruent and similar figures in real-world situations and justifies the identification.
3. identifies and performs the various transformations (reflection, translation, rotation, dilation) of a given figure on a coordinate plane.

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Benchmark MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).

Grade Level Expectations

The student:

Sixth

1. constructs tiling patterns to cover a plane.
2. identifies a tessellation.
3. identifies geometric shapes that can be tessellated.
4. tessellates using translation and other desired transformations.

Seventh

1. predicts and verifies whether a given shape or shapes will tessellate.
2. given a simple tessellated pattern, determines the shape(s) and transformation(s).
3. tessellates using reflection, translation, or rotation and any desired combinations.

Eighth

1. continues a tessellation pattern using the needed transformations.
2. creates an original tessellating tile and tessellation pattern using a combination of transformations

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

Benchmark MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.

Grade Level Expectations

The student:

Sixth

1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, triangles, squares, rectangles, parallelograms).
2. applies known geometric properties (for example, symmetry, congruence) to solve real-world and mathematical problems.

Seventh

1. observes, explains, and makes conjectures regarding geometric properties and relationships (among angles, lines, regular and irregular polygons).

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2. creates and solves angle measurement problems for triangles.
3. demonstrates the Pythagorean relationship in right triangles using models or diagrams (for example, manipulatives, dot, graph, or isometric paper).
4. given two sides of a right triangle, uses the Pythagorean Theorem to find the length of the third side.

Eighth

1. observes, explains, makes and tests conjectures regarding geometric properties and relationships (among regular and irregular shapes of two and three dimensions).
2. applies the Pythagorean Theorem in real-world problems (for example, finds the relationship among sides in $45^\circ - 45^\circ$ and $30^\circ - 60^\circ$ right triangles).

Benchmark MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.

Grade Level Expectations

The student:

Sixth

1. identifies the x and y axes in a coordinate plane and identifies the coordinates of a given point in the first quadrant.
2. plots specific points in the first quadrant of the Cartesian coordinate system.

Seventh

1. identifies each quadrant and the characteristics of points in each quadrant (positive and negative).
2. identifies and plots ordered pairs in all four quadrants of the coordinate system.

Eighth

1. given an equation or its graph, finds ordered-pair solutions (for example, $y = 2x$).
2. given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines).
3. given the graph of a linear relationship, applies and explains the simple properties of lines on a graph, including parallelism, perpendicularity, and identifying the x and y intercepts, the midpoint of a horizontal or vertical line segment, and the intersection point of two lines.

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Strand D: Algebraic Thinking

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

Benchmark MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.

Grade Level Expectations

The student:

Sixth

1. describes, predicts, and creates numerical and geometric patterns through models (for example, manipulatives, tables, graphs).
2. states in words a rule for a pattern.
3. predicts outcomes based on patterns.
4. finds patterns in real-world situations.
5. describes relationships and patterns using words, tables, symbols, variables, expressions, or equations.
6. given initial terms in a pattern, supplies a specific missing term in the pattern (for example, given first four terms, supplies sixth term).

Seventh

1. uses manipulatives and graphic materials to generate tables and charts (for example, input, output) to develop algebraic expressions, equations, or formulas.
2. given instances of a pattern, expresses a generalization of the pattern using algebraic expressions.
3. given an algebraic expression of a relationship or pattern, supplies specific instances of the relationship or pattern.
4. predicts outcomes based on a generalization of a pattern or relationship.

Eighth

1. reads, analyzes, and describes graphs of linear relationships.
2. uses variables to represent unknown quantities in real-world problems.
3. uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning.
4. finds a function rule to describe tables of related input-output variables.
5. predicts outcomes based upon function rules.

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Benchmark MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.

Grade Level Expectations

The student:

Sixth

1. interprets and creates function tables and graphs (first quadrant).
2. substitutes values for variables in expressions and describes the results or patterns observed.
3. graphs (first quadrant) functions from function tables to explain cause-and-effect relationships.

Seventh

1. interprets and creates tables, function tables, and graphs (all four quadrants).
2. writes expressions and equations to describe relationships.
3. graphs equations to explain cause-and-effect relationships.

Eighth

1. interprets and creates tables and graphs (function tables).
2. writes equations and inequalities to express relationships.
3. graphs equations and inequalities to explain cause-and-effect relationships.
4. interprets the meaning of the slope of a line from a graph depicting a real-world situation.

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

Benchmark MA.D.2.3.1: The student represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.

Grade Level Expectations

The student:

Sixth

1. uses variables to represent numbers and relationships.
2. translates verbal expressions into algebraic expressions.
3. translates simple algebraic expressions, equations or formulas representing real-world relationships into verbal expressions or sentences.
4. uses pictures, models, manipulatives or other strategies to solve simple one-step linear equations with rational solutions.

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Seventh

1. translates verbal expressions and sentences into algebraic expressions and equations.
2. translates algebraic expressions, equations, or formulas representing real-world relationships into verbal expressions or sentences.
3. given an algebraic equation or expression of a real-world application, substitutes integral values for variables and simplifies the results.
4. uses pictures, models, manipulatives or other strategies to solve one-step and simple multi-step linear equations.
5. graphs solutions to equations and inequalities on a number line.
6. graphs linear equations on the coordinate plane from a table of values.

Eighth

1. translates verbal expressions and sentences into algebraic expressions, equations, and inequalities.
2. translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences.
3. solves single- and multiple-step linear equations and inequalities in concrete or abstract form.
4. graphs linear equations on the coordinate plane using tables of values.
5. graphically displays real-world situations represented by algebraic equations or inequalities.
6. evaluates algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results.
7. simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.

Benchmark MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.

Grade Level Expectations

The student:

Sixth

1. knows how to solve simple equations representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.
2. uses concrete materials to solve equations and inequalities and explains reasoning orally or in writing.

Seventh

1. knows how to solve linear equations and inequalities representing real-world situations, using pictures, models, manipulatives (such as algebra tiles), or other strategies.

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2. simplifies algebraic expressions with one variable.

Eighth

1. simplifies algebraic expressions with a maximum of two variables.
2. solves single- and multi-step linear equations and inequalities that represent real-world situations.

Strand E: Data Analysis and Probability

Standard 1: The student understands and uses the tools of data analysis for managing information.

Benchmark MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.

Grade Level Expectations

The student:

Sixth

1. reads and analyzes data displayed in a variety of forms (charts, pictographs, stem-and-leaf plots).
2. generates and collects data for analysis.
3. chooses appropriate titles, scales, labels, keys, and intervals for displaying data in graphs.
4. constructs, interprets, and explains displays of data, such as tables and graphs (single- and multiple-bar graphs and single- and multiple- line graphs).

Seventh

1. generates and collects data for analysis.
2. interprets and analyzes data presented in a variety of forms, including box-and-whisker graphs and scatter plots.
3. constructs, interprets, and explains displays of data, such as tables and graphs (circle graphs, single- and multiple- bar graphs, and single and multiple-line graphs) and explains how different displays of data lead to different interpretations.

Eighth

1. reads and interprets data displayed in a variety of forms including histograms.
2. constructs and interprets displays of data, (including circle, line, bar, and box-and-whisker graphs) and explains how different displays of data can lead to different interpretations.

Benchmark MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).

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Grade Level Expectations

The student:

Sixth

1. organizes items in a set of data.
2. finds the range, mean, median, and mode of a set of data.
3. describes real-world data by applying and explaining appropriate procedures for finding measures of central tendency.

Seventh

1. finds the range, mean, median, and mode of data from a table, chart, or graph.
2. draws conclusions from an analysis of range and central tendency of a set of real-world data.

Eighth

1. finds the mean, median, and mode of a set of data using raw data, tables, charts, or graphs.
2. interprets measures of dispersion (range) and of central tendency.
3. determines appropriate measures of central tendency for a given situation or set of data.

Benchmark MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.

Grade Level Expectations

The student:

Sixth

1. describes a set of data by using the measures of central tendency.
2. uses technology, such as graphing calculators and computer spreadsheets, to create graphs.

Seventh

1. applies and analyzes appropriate measures of central tendency (mode, mean, median, range) for a set of data.
2. uses technology, such as graphing calculators and computer spreadsheets, to analyze data and create graphs.

Eighth

1. determines the mean, median, mode, and range of a set of real-world data using appropriate technology.
2. organizes, graphs and analyzes a set of real-world data using appropriate technology.

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

Benchmark MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.

Grade Level Expectations

The student:

Sixth

1. determines all possible outcomes of an event using a tree diagram or organized list.
2. calculates simple mathematical probabilities.
3. uses manipulatives to obtain experimental results, compares results to mathematical expectations, and discusses the validity of the experiment.

Seventh

1. obtains experimental results using manipulatives.
2. explains observed difference between mathematical and experimental results.
3. calculates simple mathematical probabilities for independent and dependent events.

Eighth

1. compares and explains the results of an experiment with the mathematically expected outcomes.
2. calculates simple mathematical probabilities for independent and dependent events.

Benchmark MA.E.2.3.2: The student determines odds for and odds against a given situation.

Grade Level Expectations

The student:

Sixth

1. examines and describes situations that include finding the odds for and against a specified outcome.

Seventh

1. computes the mathematical odds for and against a specified outcome in given real-world experiments.

Eighth

1. predicts the mathematical odds for and against a specified outcome in a given real-world situation.

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

Benchmark MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.

Grade Level Expectations

The student:

Sixth

1. with classmates, formulates hypotheses based on research and prior data, designs an appropriate experiment, collects and analyses data using appropriate statistics, and displays and interprets results in appropriate tables or graphs.

Seventh

1. formulates a hypothesis and designs an experiment.
2. performs the experiment and collects, organizes, and displays the data.
3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.

Eighth

1. formulates a hypothesis and designs an experiment.
2. performs the experiment and collects, organizes, and displays the data.
3. evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.

Benchmark MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.

Grade Level Expectations

The student:

Sixth

1. explores uses and misuses of statistics in real-world situations such as advertisements and polls.

Seventh

1. knows appropriate uses of statistics and probability in real-world situations.
2. knows when statistics and probability are used in misleading ways.

Eighth

1. knows appropriate uses of statistics and probability in real-world situations.

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2. knows when statistics and probability are used in misleading ways.
3. identifies and uses different types of sampling techniques (for example, random, systematic, stratified).
4. knows whether a sample is biased.