

Mathematics Kindergarten

Concepts and Principles of Measurement

1. Compare the length, weight, and capacity of objects by making direct comparisons with reference objects
2. Demonstrate and understanding of concepts of time, and tools that measure time
3. Name the days of the week
4. Identify the time (to the nearest hour) of everyday events

Data Analysis, Probability, and Statistics

1. Pose information questions; collect data; and record the results using objects, pictures, and picture graphs
2. Identify, describe, and extend simple patterns by referring to their shapes, sizes, or colors

Number and Operation

1. Compare two or more sets of objects and identify which set is equal to, more than, or less than the other
2. Count recognize, represent, name, and order a number of objects (up to 30)
3. Know that the larger numbers describe sets with more objects in them than the smaller numbers have.
4. Use concrete objects to determine the answers to addition and subtraction problems (for two numbers less than 10).
5. Recognize when an estimate is reasonable.

Algebra and Functions

1. Identify, sort and classify objects by attribute and identify objects that do not belong to a particular group

Measurement and Geometry

1. Identify and describe common geometric objects
2. Compare familiar plane and solid objects by common attributes

Mathematical Reasoning (Not in Descartes)

1. Determine the approach, materials, and strategies to be used to set up a problem
2. Use tools and strategies, such as manipulatives or sketches, to model problems
3. Explain the reasoning used with concrete objects and/or pictorial representations
4. Make precise calculations and check the validity of the results in the context of the problem.

Mathematics Grade 1

Concepts and Principles of Measurement

1. Use direct comparison and nonstandard units to describe the measurements of objects
2. Tell time to the nearest half hour and relate time to events.

Statistics, Data Analysis, and Probability

1. Organize, represent, and compare data by category on simple graphs and charts
2. Sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, or colors

Number Sense

1. Count, read, and write whole numbers to 100.
2. Count and group objects in ones and tens.
3. Identify and know the value of coins and show different combinations of coins that equal the same value.
4. Know the addition facts (sums to 20) and the corresponding subtraction facts and commit them to memory.
5. Use the inverse relationship between addition and subtraction to solve problems.
6. Identify one more than, one less than, 10 more than, and 10 less than a given number.
7. Count by 2s, 5s, and 10s to 100.
8. Solve addition and subtraction problems with one and two digit numbers.
9. Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, and hundreds places

Algebra and Functions

1. Students use number sentences with operational symbols and expressions to solve problems

Concepts and Principles of Geometry

1. Identify common geometric figures, classify them by common attributes, and describe their relative position or their location in space
2. Classify familiar plane and solid objects by common attributes, such as color, position, shape, size, roundness, or number of corners, and explain which attributes are being used for classification.
3. Give and follow directions about location.

Mathematical Reasoning (Not in Descartes)

1. Students make decisions about how to set up a problem
2. Students solve problems and justify their reasoning
3. Students note connections between one problem and another

Mathematics Grade 2

Concepts and Principles of Measurement

1. Measure the length of objects by repeating a nonstandard or standard unit.
2. Use different units to measure the same object
3. Measure the length of an object to the nearest inch and/or centimeter
4. Tell time to the nearest quarter hour and know relationships of time (minutes in an hour, days in a month, etc.)
5. Determine the duration of intervals of time in hours.
6. Use appropriate tools and units to measure temperature, weight, capacity.

Data Analysis, Probability, and Statistics

1. Collect, organize, and display data.
2. Record numerical data in systematic ways.
3. Recognize, describe, extend and determine the next term in linear patterns.

Number and Operations

1. Count, read, and write whole numbers to 1,000 and identify place value for each digit.
2. Order and compare whole numbers using symbols ($>$, $=$, $<$).
3. Understand and use the inverse relationship between addition and subtraction to solve problems and check solutions.
4. Find the sum or difference of two whole numbers up to three digits long.
5. Model and solve simple problems involving multiplication using repeated addition, arrays, and counting by multiples.
6. Recognize fractions of a whole and parts of a group.
7. Model and solve problems by representing, adding, and subtracting amounts of money.
8. Know and use the decimal notation and the dollar and cent symbols for money.
9. Recognize when an estimate is reasonable in measurements.

Concepts and Language of Algebra and Functions

1. Use the commutative and associative rules to simplify mental calculations and to check results.
2. Solve addition and subtraction problems by using data from simple charts, picture graphs, and number sentences.

Concepts and Principles of Geometry

1. Describe and classify plane and solid geometric shapes according to the number and shape of faces, edges, and vertices.
2. Put shapes together and take them apart to form other shapes

Mathematical Reasoning (Not in Descartes)

1. Students make decisions about how to set up a problem
2. Students solve problems and justify their reasoning.
3. Students note connections between one problem and another.

Mathematics Grade 3

Concepts and Principles of Measurement

1. Choose and use appropriate units and measurement tools to quantify the properties of objects
2. Find the perimeter of a polygon with integer sides.

Number and Operations

1. Understand the place value of whole numbers to 10,000
2. Calculate, and solve problems involving addition, subtraction, multiplication, and division
3. Memorize the multiplication table for numbers between one and ten.
4. Solve division problems in which a multi-digit number is evenly divided by a one digit number.
5. Students understand the relationship between whole numbers, simple fractions, and decimals
6. Identify place value for each digit in numbers to 10,000.
7. Use expanded notation to represent numbers.
8. Add and subtract simple fractions
9. Solve problems involving addition, subtraction, multiplication, and division of money amounts.

Algebra and Functions

1. Select appropriate symbols, operations, and properties to represent, describe, simplify, and solve simple number relationships
2. Represent simple functional relationships
3. Recognize and use the commutative and associative properties of multiplication.

Measurement and Geometry

1. Students describe and compare the attributes of plane and solid geometric figures (triangles, quadrilaterals, polygons) and use their understanding to show relationships and solve problems

Statistics, Data Analysis, and Probability

1. Conduct simple probability experiments by determining the number of possible outcomes and make simple predictions
2. Summarize and display the results of probability experiments in a clear and organized way.

Mathematical Reasoning (Not in Descartes)

1. Students make decisions about how to approach problems
2. Students use strategies, skills, and concepts in finding solutions
3. Students move beyond a particular problem by generalizing to other situations.

Mathematics Grade 4

Concepts and Principles of Measurement

1. Measure the area of rectangular shapes by using appropriate units
2. Recognize that rectangles that have the same area can have different perimeters
3. Understand that rectangles that have the same perimeter can have different areas
4. Draw the points corresponding to linear relationships on graph paper
5. Understand that the length of a horizontal line segment equals the difference of the x coordinates and the length of a vertical line segment equals the difference of the y coordinates

Data Analysis, Probability, and Statistics

1. Formulate survey questions; collect and represent data on a number line; and coordinate graphs, tables, and charts
2. Identify the mode(s), median, and apparent outliers for numerical data sets
3. Represent all possible outcomes for a simple probability situation in an organized way
4. Express outcomes of experimental probability situations verbally and numerically

Number and Operation

1. Read and Write Whole Numbers to the millions
2. Order and compare whole numbers and decimals to two decimal places
3. Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand
4. Write the fraction represented by a drawing of parts of a figure; represent a given fraction by using drawings; and relate a fraction to a simple decimal on a number line.
5. Use concepts of negative numbers
6. Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places.
7. Estimate and compute the sum or difference of whole numbers and positive decimals to two places
8. Round two place decimals to one decimal or the nearest whole number
9. Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths
10. Multiply a multi-digit number by a two digit number
11. Solve problems involving division of multi-digit numbers by one-digit numbers
12. Understand that many whole numbers break down in different ways
13. Know that numbers such as 2, 3, 5, 7 and 11 do not have any factors except 1 and themselves and that such numbers are called prime numbers

Concepts and Language of Algebra and Functions

1. Understand and use the concept of a variable
2. Interpret and evaluate mathematical expressions that use parentheses
3. Use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.
4. Use and interpret formulas to answer questions about quantities and their relationships
5. Know and understand that equals added to equals are equal
6. Know and understand that equals multiplied by equals are equal

Concepts and Principles of Geometry

1. Understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use those formulas to find the areas of more complex figures by dividing the figures into basic shapes.
2. Identify lines that are parallel and perpendicular
3. Identify the radius and diameter of a circle
4. Identify congruent figures
5. Identify figures that have bilateral and rotational symmetry
6. Know the definitions of a right angle, an acute angle, and an obtuse angle
7. Know the definitions of different triangles and identify their attributes
8. Visualize, describe, and make models of geometric solids
9. Know the definition of different quadrilaterals

Mathematical Reasoning (Not in Descartes)

1. Students make decisions about how to approach problems
2. Use estimation to verify the reasonableness of calculated results
3. Apply strategies and results from simpler problems to more complex problems
4. Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning
5. Make precise calculations and check the validity of the results from the context of the problem
6. Evaluate the reasonableness of the solution in the context of the original situation
7. Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems
8. Develop generalizations of the results obtained and apply them in other circumstances

Mathematics Grade 5

Concepts and Principles of Measurement

1. Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools.
2. Know that the sum of the angles of any triangle is 180 degrees and the sum of the angles of any quadrilateral is 360 degrees and use this information to solve problems.
3. Convert units of length and time.

Data Analysis, Probability, and Statistics

1. Know the concepts of mean, median, range, and mode; compute and compare simple examples to show that they may differ.
2. Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph
3. Know how to write ordered pairs correctly.

Number and Operation

1. Interpret percents as a part of a hundred; find decimal and percent equivalents for common fractions; compute a given percent of a whole number
2. Determine the prime factors of all numbers through 50 and write the numbers as product of their prime factors by using exponents to show multiples of a factor.
3. Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers.
4. Add, subtract, multiply, and divide with decimals.
5. Demonstrate proficiency with division including division with decimals and multi-digit divisors.
6. Solve simple problems, including ones arising in concrete situations involving the addition and subtraction of fractions and mixed numbers. Express answers in simplest form.
7. Compute and perform simple multiplication and division of fractions.

Concepts and Language of Algebra and Functions

1. Use a letter to represent an unknown number; write and evaluate simple algebraic expressions in one variable by substitution.
2. Know and use the distributive property in equations and expressions with variables.
3. Identify and graph ordered pairs in the four quadrants of the coordinate plane
4. Solve problems involving linear functions with integer values.

Concepts and Principles of Geometry

1. Students understand and compute the volumes and areas of simple objects.
2. Construct a cube and rectangular box from two-dimensional patterns and use these patterns to compute the surface area for these objects.
3. Understand the concept of volume and use the appropriate units in common measuring systems

Mathematical Reasoning (Not in Descartes)

1. Students make decisions about how to approach problems
2. Use estimation to verify the reasonableness of calculated results
3. Apply strategies and results from simpler problems to more complex problems
4. Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning
5. Make precise calculations and check the validity of the results from the context of the problem
6. Evaluate the reasonableness of the solution in the context of the original situation
7. Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems
8. Develop generalizations of the results obtained and apply them in other circumstances

Mathematics Grade 6

Concepts and Principles of Measurement

1. Measure accurately units of time, length, temperature, weight, capacity, using correct tools and appropriate units.
2. Understand the concept of a constant such as π ; know the formulas for the circumference and area of a circle.
3. Know and use the formulas for the volume of rectangular solids, triangular prisms, and cylinders.
4. Convert one unit of measurement to another (feet to miles, etc).
5. Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.

Data Analysis, Probability, and Statistics

1. Compute the range, mean, median, and mode of data sets
2. Know why a specific measure of central tendency provides the most useful information in a given context.
3. Identify different ways of selecting a sample, and which method makes a more representative sample for a population
4. Analyze data displays and explain how the questions and the display of results might influence conclusions reached.
5. Represent possible outcomes for compound events in an organized way and express the probability of each outcome.
6. Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages and verify that the probabilities computed are reasonable.
7. Understand the difference between independent and dependent events.

Number and Operation

1. Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.
2. Interpret and use ratios in different contexts.
3. Use proportions to solve problems. Use cross-multiplication as a method for solving such problems.
4. Calculate different percentages of quantities including discounts, interest, and tips earned.
5. Solve problems involving addition, subtraction, multiplication, and division of fractions
6. Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations that use positive and negative integers.
7. Determine the least common multiple and greatest common divisor of whole numbers and use them to solve fraction problems.

Concepts and Language of Algebra and Functions

1. Write and solve one step linear equations in one variable.
2. Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions.
3. Solve problems involving rates, average speed, distance, and time.
4. Solve problems involving linear functions with integer values.
5. Use variables in expressions describing geometric quantities.

Concepts and Principles of Geometry

1. Students understand and compute the volumes and areas of simple objects.
2. Construct a cube and rectangular box from two-dimensional patterns and use these patterns to compute the surface area for these objects.
3. Understand the concept of volume and use the appropriate units in common measuring systems

Mathematical Reasoning (Not in Descartes)

1. Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
2. Determine when and how to break a problem into simpler parts.
3. Use estimation to verify the reasonableness of calculated results
4. Apply strategies and results from simpler problems to more complex problems
5. Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning
6. Make precise calculations and check the validity of the results from the context of the problem
7. Evaluate the reasonableness of the solution in the context of the original situation
8. Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems
9. Develop generalizations of the results obtained and apply them in other circumstances

Mathematics Grade 7

Concepts and Principles of Measurement

1. Solve problems involving ratios, rates, and proportions.

Data Analysis, Probability, and Statistics

1. Collect, organize, and represent data sets with one or more variables.

Number and Operation

1. Add, subtract, multiply and divide rational numbers.
2. Convert fractions, decimals, and percents; know common conversions.
3. Understand and use scientific notation.
4. Understand and solve problems involving exponents, powers, and roots.
5. Know and use mathematical properties – identity, inverse, distributive, commutative, associative – to solve problems.
6. Simplify using exponents.
7. Use factors, multiples, and prime factorization to solve problems.

Concepts and Language of Algebra and Functions

1. Graph linear functions.
2. Plot the value of quantities whose ratios are always the same.
3. Solve simple linear equations and inequalities including two step problems in one variable, multi-step problems involving direct variation (rate, average speed, distance, time).

Concepts and Principles of Geometry

1. Compute the perimeter, area, volume of common geometric figures in two and three dimensions.
2. Know and use the Pythagorean Theorem.
3. Know and use the concept of congruence.

*Mathematical Reasoning (Not in Descartes)

1. Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
2. Determine when and how to break a problem into simpler parts.
3. Use estimation to verify the reasonableness of calculated results
4. Apply strategies and results from simpler problems to more complex problems
5. Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning
6. Make precise calculations and check the validity of the results from the context of the problem
7. Evaluate the reasonableness of the solution in the context of the original situation
8. Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems
9. Develop generalizations of the results obtained and apply them in other circumstances

Mathematics Grade 8

Concepts and Principles of Measurement

1. Select and use appropriate units and tools to make formal measurements in both (metric and customary) systems.
2. Convert units of measurement within each system in problem solving situations.

Data Analysis, Probability, and Statistics

1. Analyze and interpret tables, charts, and graphs, including frequency tables, scatter plots, broken line graphs, line plots, bar graphs, histograms, circle graphs, and stem-and-leaf plots.
2. Explain and justify conclusions drawn from tables, charts, and graphs.
3. Choose and calculate the appropriate measure of central tendency – mean, median, and mode.

Number and Operation

1. Compare magnitudes and relative magnitudes of rational numbers, including absolute values.
2. Convert between standard form, scientific notation, and exponential form.
3. Apply number theory concepts (primes, composites, prime factorization, least common multiple, greatest common factor).
4. Evaluate numerical expressions with rational numbers using the order of operations.
5. Use a variety of strategies including common mathematical formulas to compute problems drawn from life situations.
6. Identify whether a given estimate is an overestimate or underestimate.

Concepts and Language of Algebra and Functions

1. Use variables in expressions, equations, and inequalities.
2. Translate simple word statements and story problems into algebraic expressions and equations.
3. Use symbols to express relationships ($<$, $=$, $>$, \neq , \leq , and \geq).
4. Use the order of operations in evaluating simple algebraic expressions.
5. Extend patterns and identify a rule that generates the pattern.
6. Use patterns and linear functions to represent and solve problems.

Concepts and Principles of Geometry

1. Draw and measure various angles and shapes using appropriate tools.
2. Apply the fundamental concepts, properties, and relationships among points, lines, rays, planes, and angles.
3. Identify and model the effects of reflections, translations, rotations, and scaling on various shapes.

Mathematical Reasoning (Not in Descartes)

1. Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
2. Determine when and how to break a problem into simpler parts.
3. Use estimation to verify the reasonableness of calculated results
4. Apply strategies and results from simpler problems to more complex problems
5. Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning
6. Make precise calculations and check the validity of the results from the context of the problem
7. Evaluate the reasonableness of the solution in the context of the original situation
8. Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems
9. Develop generalizations of the results obtained and apply them in other circumstances

Algebra 1 Grade 8

Concepts and Principles of Measurement

1. Identify the slope and y-intercept
2. Determine distance on a coordinate plane

Data Analysis, Probability, and Statistics

1. Solve problems: proportions, percents, and set up linear equations.
2. Use stem and leaf plots
3. Identify mean, median, and mode
4. Graph and interpret linear relations
5. Solve probability problems
6. Graph exponential growth and decay (problem solving and graphing)
7. Graph inequalities

Number and Operation

1. Order of operations
2. Scientific notation
3. Associative, commutative, and distributive properties

Concepts and Language of Algebra and Functions

1. Solution of a linear system
2. Solve compound inequalities
3. Properties of exponents
4. Multiply polynomials and binomials (FOIL)
5. Solve Quadratic equations
6. Simplify radicals
7. Linear equations
8. Function notation
9. Factoring and prime factorization
10. Differentiate between different forms of linear equations
11. Solve equations
12. Properties of quadratic functions: vertex, minimum, maximum, intercepts
13. Combining like terms
14. Polynomials

Concepts and Principles of Geometry

1. Pythagorean Theorem
2. Perpendicular and parallel lines