



CRCT Content Descriptions

based on the Georgia Performance Standards

Mathematics

Grades 1 - 8



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Criterion-Referenced Competency Tests (CRCT)
Content Descriptions
Mathematics

Georgia law requires the development and administration of the CRCT in the content areas of Reading, English/Language Arts, Mathematics, Science, and Social Studies. Each spring students in grades 1 through 8 take the Reading, English/Language Arts, and Mathematics CRCT, while students in grades 3 through 8 also take the Science and Social Studies CRCT. These tests are designed to measure student achievement of the Georgia Performance Standards (GPS).

Program Purpose

The CRCT is designed to measure student acquisition and understanding of the knowledge, concepts, and skills set forth in the GPS. The testing program serves as a measure of the quality of education in the state. Reports yielding information on academic achievement at the student, class, school, system, and state levels are produced annually.

Mandated Grades for Mathematics

Grades 1 through 8 are mandated to participate in the Mathematics CRCT each spring.

CRCT Content Descriptions

The CRCT Content Descriptions are provided to acquaint Georgia educators with the content coverage of the CRCT. Only the knowledge, concepts, and skills reflected in the GPS will be assessed on the CRCT. Committees of Georgia educators reviewed the curriculum and provided guidance for the assessment program.

It is important to note that some curricular standards are better suited for classroom or individual assessment rather than large-scale, paper-pencil assessment. While those curricular standards designed for classroom/individual assessment are not included in the Content Descriptions, the knowledge, concepts, and skills outlined are often required for the mastery of the standards that are assessed. Therefore, the CRCT Content Descriptions are in *no way* intended to substitute for the GPS; they are provided to help educators better understand how the curriculum will be assessed. Further, the CRCT Content Descriptions, *by no means*, suggest *when* concepts and skills should be introduced in the instructional sequence; rather, its purpose is to communicate when concepts and skills will be assessed on the CRCT. Georgia law requires educators to teach the standards set forth in the state-adopted curriculum (i.e., the GPS). The GPS is located at <http://www.georgiastandards.org>.

Mathematics Content Domains

To provide reliable measures as well as structure to the assessment program, the curricular standards provided in the GPS were grouped into content domains. Each domain is comprised of standards with similar content characteristics. The domains for Mathematics are:

Grade 1–2

Number and Operations

Measurement

Geometry

Data Analysis and Probability

Grade 6

Number and Operations

Measurement

Geometry

Algebra

Data Analysis and Probability

Grade 3–5

Number and Operations

Measurement

Geometry

Algebra

Data Analysis

Grade 7–8

Number and Operations

Geometry

Algebra

Data Analysis and Probability

The GPS in mathematics requires that mathematical concepts be taught in the context of real world phenomena. The mathematical process standards require students to solve single and multi-step routine and non-routine word problems while implementing a variety of problem solving strategies. The process standards concepts and skills are taught and applied within context rather than merely following a prescribed algorithm. The concepts and skills inherent in the process standards are integrated in items across the five content domains.

Using the Mathematics CRCT Content Descriptions

The Mathematics CRCT Content Descriptions provide information about the content and skills assessed by the CRCT. The documents are organized by grade and content domain. The curriculum standards assessed in each domain are provided as are the related concepts, skills, and abilities assessed. It is important to note the differences between the GPS and the former curriculum. The GPS is a conceptual curriculum, requiring instruction be integrated; the concepts, knowledge, skills, and abilities described in this document should not be viewed as discrete or taught in isolation. Deep understanding by students, resulting in higher achievement, is best achieved when the full curriculum is taught in an integrated, conceptual fashion.

Mathematics

Grade: 1

Domain: Number and Operations

Domain Description

Number and Operations domain refers to students' skill in understanding and representing numbers, and being able to add and subtract small numbers.

Standards Associated with Domain

M1N1

M1N2

M1N3

M1N4

Associated Concepts, Skills, and Abilities

- Represent numbers less than 100 using a variety of models, diagrams, and number sentences, and use counters and pictures to represent numbers larger than 10 in terms of tens and ones
- Count and represent the number of objects in a set using numerals (up to 100)
- Compare small sets using the terms greater than, less than, and equal to ($>$, $<$, $=$)
- Understand the magnitude and order of numbers up to 100 by making ordered sequences and representing them on a number line
- Exchange equivalent quantities of coins by making fair trades involving combinations of pennies, nickels, dimes, and quarters, and count out a combination needed to purchase items less than a dollar
- Identify bills (\$1, \$5, \$10, \$20) by name and value, exchange equivalent quantities by making fair trades involving combinations of bills, and count out a combination of bills needed to purchase items less than twenty dollars
- Determine to which multiple of ten a given number is nearest using tools such as a sequential number line or hundreds chart to assist in estimating
- Represent collections of less than 30 objects with 2-digit numbers and understand the meaning of place value
- Decompose numbers between 11 and 19 as one ten and the appropriate number of ones
- Identify one more than, one less than, 10 more than, and 10 less than a given number
- Skip-count by 2s, 5s, and 10s forward and backwards — to and from numbers up to 100
- Compose/decompose numbers up to 10, “break numbers apart,” (e.g., 8 is represented as $4 + 4$, $3 + 5$, $5 + 2 + 1$, and $10 - 2$)
- Describe or identify a variety of situations to which subtraction may apply: taking away from a set, comparing two sets, and determining how many more or how many less
- Identify addition and subtraction number combinations using strategies such as counting on, counting back, doubles, and making tens
- Know the single-digit addition facts to 18 and corresponding subtraction facts with understanding and fluency
- Apply addition and subtraction to 2-digit numbers without regrouping (e.g., $15 + 4$, $80 - 60$, $56 + 10$, $100 - 30$, $52 + 5$)

- Solve and create word problems involving addition and subtraction to 100 without regrouping. Use words, pictures and concrete models to interpret story problems and reflect the combining of sets as addition and taking away or comparing elements of sets as subtraction
- Use informal strategies to share objects (up to 100) equally between two to five people
- Build number patterns, including concepts of even and odd numbers, using various concrete representations
- Identify, label, and relate fractions (halves, fourths) as equal parts of a whole using pictures and models

Mathematics

Grade: 1

Domain: Measurement

Domain Description

Measurement domain refers to students' skill in understanding basic quantitative attributes of concrete objects.

Standards Associated with Domain

M1M1

M1M2

Associated Concepts, Skills, and Abilities

- Compare length, weight, and capacity of concrete objects using direct comparison or a non-standard unit
- Estimate and measure using a nonstandard unit that is smaller than the object to be measured
- Tell time to the nearest hour and half hour, and understand the movement of the minute hand and how it relates to the hour hand
- Express a basic understanding of the relationship of calendar time by knowing the number of days in a week and the number of months in a year
- Order and compare the sequence or duration of events (e.g., shorter/longer, before/after)

Mathematics

Grade: 1

Domain: Geometry

Domain Description

Geometry domain refers to students' skill in understanding the concepts of basic geometric shapes and spatial relationships of concrete objects.

Standards Associated with Domain

M1G1

M1G2

M1G3

Associated Concepts, Skills, and Abilities

- Represent, name, and describe triangles, rectangles, pentagons, and hexagons
- Represent, understand, name, and describe cylinders, cones, and rectangular prisms and identify the Basic figures (squares, circles, triangles, and rectangles) within them
- Compare, contrast, and classify geometric shapes by position, shape, size, number of sides, and number of corners
- Arrange and describe objects in space by proximity, position, and direction (e.g. near, far, below, Above, up, down, behind, in front of, next to, and left or right of)

Mathematics

Grade: 1

Domain: Data Analysis and Probability

Domain Description

Data Analysis and Probability domain refers to students' skill in posing questions, collecting, organizing, and interpreting data about themselves and their surroundings.

Standard Associated with Domain

M1D1

Associated Concepts, Skills, and Abilities

- Interpret tally marks, picture graphs, bar graphs, and tables
- Organize and record data using objects, pictures, tally marks, and picture graphs

Mathematics

Grade: 1

Mathematical Process Skills

Mathematical Process Skills are integrated across the four domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M1P1

M1P2

M1P3

M1P4

M1P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics

Grade: 2

Domain: Number and Operations

Domain Description

Number and Operations domain refers to students' skill in developing their understanding of numbers including fractions and how to represent them; in understanding and applying addition, subtraction, and multiplication through concrete manipulation; and in performing basic calculations.

Standards Associated with Domain

M2N1

M2N2

M2N3

M2N4

M2N5

Associated Concepts, Skills, and Abilities

- Represent numbers using a variety of models, diagrams, and number sentences (e.g. 4703 represented as $4,000 + 700 + 3$, and units, 47 hundreds + 3, or $4,500 + 203$)
- Distinguish the relative magnitudes of numbers using 10 as a unit, 100 as a unit, or 1,000 as a unit. Represent 2-digit numbers with drawings of tens and ones and 3-digit numbers with drawings of hundreds, tens, and ones
- Use money as a medium of exchange. Count back change and use decimal notation and the dollar and cent symbols to represent a collection of coins and currency
- Add and subtract two whole numbers up to three digits each with regrouping
- Understand and use the inverse relation between addition and subtraction to solve problems and check solutions
- Determine and use mental math strategies such as benchmark numbers to solve problems
- Use basic properties of addition (commutative, associative, and identity) to simplify problems
- Estimate to determine if solutions are reasonable for addition and subtraction
- Represent multiplication as repeated addition
- Use repeated addition, arrays, and counting by multiples (skip-counting) to correctly multiply 1-digit numbers and construct a multiplication table
- Determine the product of two numbers using a multiplication table
- Use repeated subtraction, equal sharing, and forming equal groups to divide large collections of objects and determine factors for multiplication
- Model, identify, label, and compare fractions (thirds, sixths, eighths, and tenths) as a representation of equal parts of a whole or of a set
- Know that when all fractional parts are included, such as three-thirds, the result is equal to the whole
- Include the use of boxes or _____ to represent a missing value ($=$, $<$, or $>$)
- Represent problem-solving situations where addition, subtraction, or multiplication may be applied using mathematical expressions, including equality and inequality signs

Mathematics

Grade: 2

Domain: Measurement

Domain Description

Measurement domain refers to students' skill in understanding length, time, and temperature and choosing an appropriate tool to measure them.

Standards Associated with Domain

M2M1

M2M2

M2M3

Associated Concepts, Skills, and Abilities

- Measure length to the nearest inch or centimeter
- Compare the relationship of one unit to another by measuring objects twice using different units each time (inch, foot, yard, centimeter, and meter)
- Estimate lengths and measure to determine if estimations were reasonable
- Determine an appropriate tool and unit for measuring
- Tell time to the nearest five minutes and know the relationships of time such as the number of minutes in an hour and the number of hours in a day
- Estimate, then measure, temperature (Fahrenheit), and determine if estimations were reasonable

Mathematics**Grade: 2****Domain: Geometry****Domain Description**

Geometry domain refers to students' skill in understanding basic and compound geometric shapes together with the elements from which they are composed.

Standards Associated with Domain

M2G1

M2G2

M2G3

Associated Concepts, Skills, and Abilities

- Describe and classify plane figures (triangles, squares, rectangles, trapezoids, quadrilaterals, pentagons, hexagons, and irregular polygonal shapes) according to the number of edges and vertices and the sizes of angles (right, obtuse, or acute angle)
- Recognize the plane shapes of the faces of a geometric solid and count the number of faces of each type
- Recognize the shape of an angle as right, obtuse, or acute
- Describe the change in attributes as two- and three-dimensional shapes are cut and rearranged

Mathematics

Grade: 2

Domain: Data Analysis and Probability

Domain Description

Data Analysis and Probability domain refers to students' skill in posing questions, collecting, organizing, and interpreting data about themselves and their surroundings.

Standard Associated with Domain

M2D1

Associated Concepts, Skills, and Abilities

- Organize and display data using picture graphs, Venn diagrams, bar graphs, and simple charts and tables to record results
- Interpret picture graphs, Venn diagrams, and bar graphs

Mathematics

Grade: 2

Mathematical Process Skills

Mathematical Process Skills are integrated across the four domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M2P1

M2P2

M2P3

M2P4

M2P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics

Grade: 3

Domain: Number and Operations

Domain Description

Number and Operations refers to students' skill in using decimals and common fractions to represent parts of a whole. This domain also refers to students' skill in understanding the four arithmetic operations for whole numbers and using them in basic calculations and problem-solving situations.

Standards Associated with Domain

M3N1

M3N2

M3N3

M3N4

M3N5

Associated Concepts, Skills, and Abilities

- Identify place values from tenths through ten thousands
- Understand the relative sizes of digits in place value notation (10 times, 100 times, $1/10$ of a single digit whole number) and ways to represent them
- Use the properties of addition and subtraction to compute and verify the results of computation
- Use mental math and estimation strategies to add and subtract
- Solve problems requiring addition and subtraction
- Describe the relationship between addition and multiplication i.e., multiplication is defined as repeated addition
- Know the multiplication facts with understanding and fluency to 10×10
- Use arrays and area models to develop understanding of the distributive property and to determine partial products for multiplication of 2- or 3-digit numbers by a 1-digit number
- Understand the effect on the product when multiplying by multiples of 10
- Apply the identity, commutative, and associative properties of multiplication and verify the results
- Use mental math and estimation strategies to multiply
- Solve problems requiring multiplication
- Understand the relationship between division and multiplication and between division and subtraction
- Recognize that division may be two situations: the first is determining how many equal parts of a given size or amount may be taken away from the whole as in repeated subtraction, and the second is determining the size of the parts when the whole is separated into a given number of equal parts as in a sharing model
- Recognize problem-solving situations in which division may be applied and write corresponding mathematical expressions
- Explain the meaning of a remainder in division in different circumstances
- Divide a 2- and 3-digit number by a 1-digit divisor
- Solve problems requiring division
- Understand a decimal (i.e., 0.1) and a common fraction (i.e., $1/10$) represent parts of a whole

- Understand the fraction a/b represents a equal sized parts of a whole that is divided into b equal sized parts
- Understand a one place decimal represents tenths, i.e., $0.3 = 3/10$
- Know and use decimals and common fractions to represent the size of parts created by equal divisions of a whole
- Understand the concept of addition and subtraction of decimals and common fractions with like denominators
- Model addition and subtraction of decimals and common fractions
- Solve problems involving fractions

Mathematics

Grade: 3

Domain: Measurement

Domain Description

Measurement refers to students' skill in understanding and measuring time and length. This domain also refers to students' skill in modeling and calculating perimeters and areas of simple geometric figures.

Standards Associated with Domain

M3M1

M3M2

M3M3

M3M4

Associated Concepts, Skills, and Abilities

- Students will further develop their understanding of the concept of time by determining elapsed time of a full, half, and quarter hour
- Use the units kilometer (km) and mile (mi) to discuss the measure of long distances
- Measure to the nearest $\frac{1}{4}$ inch, $\frac{1}{2}$ inch, and millimeter (mm) in addition to the previously learned inch, foot, yard, centimeter, and meter
- Estimate length and represent it using appropriate units
- Compare one unit to another within a single system of measurement
- Understand the meaning of the linear unit and measurement in perimeter
- Understand the concept of perimeter as being the boundary of a simple geometric figure
- Determine the perimeter of a simple geometric figure by measuring and summing the lengths of the sides
- Understand the meaning of the square unit in measuring area
- Model (by tiling) the area of a simple geometric figure using square units (square inch, square foot, etc.)
- Determine the area of squares and rectangles by counting, adding, and multiplying with models

Mathematics**Grade: 3****Domain: Geometry****Domain Description**

Geometry refers to students' skill in further understanding the characteristics of previously studied geometric figures.

Standard Associated with Domain

M3G1

Associated Concepts, Skills, and Abilities

- Draw and classify previously learned fundamental geometric figures as well as scalene, isosceles, and equilateral triangles
- Identify and explain the properties of fundamental geometric figures
- Examine and compare angles of fundamental geometric figures
- Identify the center, diameter, and radius of a circle

Mathematics**Grade: 3****Domain: Algebra****Domain Description**

Algebra refers to students' skill in understanding how to express mathematical relationships as mathematical expressions.

Standard Associated with Domain

M3A1

Associated Concepts, Skills, and Abilities

- Describe and extend numeric and geometric patterns
- Describe and explain a quantitative relationship represented by a formula (such as the perimeter of a geometric figure)
- Use a symbol, such as \square and Δ , to represent an unknown and find the value of the unknown in a number sentence

Mathematics**Grade:** 3**Domain:** Data Analysis**Domain Description**

Data Analysis refers to students' skill in gathering, organizing, and displaying data and interpreting graphs.

Standard Associated with Domain

M3D1

Associated Concepts, Skills, and Abilities

- Solve problems by organizing and displaying data in bar graphs and tables
- Construct and interpret bar graphs using scale increments of 1, 2, 5, and 10

Mathematics

Grade: 3

Mathematical Process Skills

Mathematical Process Skills are integrated across the five domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M3P1

M3P2

M3P3

M3P4

M3P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics

Grade: 4

Domain: Number and Operations

Domain Description

Number and Operations refers to students' skill in further developing understanding of numbers and mastering the four basic operations with whole numbers by solving problems. This domain also refers to students' skill in understanding rounding and its appropriate use and adding and subtracting decimals and common fractions with common denominators.

Standards Associated with Domain

M4N1	M4N2	M4N3	M4N4
M4N5	M4N6	M4N7	

Associated Concepts, Skills, and Abilities

- Identify place value names and places from hundredths through one million
- Equate a number's word name, its standard form, and its expanded form
- Round numbers to the nearest ten, hundred, or thousand
- Describe situations in which rounding numbers would be appropriate and determine whether to round to the nearest ten, hundred, or thousand
- Understand the meaning of rounding a decimal to the nearest whole number
- Represent the results of computation as a rounded number when appropriate and estimate a sum or difference by rounding numbers
- Solve problems involving multiplication of 2-3 digit numbers by 1-2 digit numbers
- Know the division facts with understanding and fluency
- Solve problems involving division by a 2-digit number (including those that generate a remainder)
- Understand the relationship between dividend, divisor, quotient, and remainder
- Understand and explain the effect on the quotient of multiplying or dividing both the divisor and dividend by the same number ($2050 \div 50$ yields the same answer as $205 \div 5$)
- Understand decimals are a part of the base-ten system
- Understand the relative size of numbers and order two digit decimals
- Add and subtract both one and two digit decimals
- Model multiplication and division of decimals by whole numbers
- Multiply and divide both one and two digit decimals by whole numbers
- Understand representations of simple equivalent fractions
- Add and subtract fractions and mixed numbers with common denominators (Denominators should not exceed twelve)
- Convert and use mixed numbers and improper fractions interchangeably
- Describe situations in which the four operations may be used and the relationships among them
- Compute using the order of operations, including parentheses
- Compute using the commutative, associative, and distributive properties
- Use mental math and estimation strategies to compute

Mathematics**Grade:** 4**Domain:** Measurement**Domain Description**

Measurement refers to students' skill in understanding weight, using appropriate metric and standard units, and in measuring angles.

Standards Associated with Domain

M4M1

M4M2

Associated Concepts, Skills, and Abilities

- Use standard and metric units to measure the weight of objects
- Know units used to measure weight (gram, kilogram, ounce, pound, and ton)
- Compare one unit to another within a single system of measurement
- Use tools, such as a protractor or angle ruler, and other methods, such as paper folding or drawing a diagonal in a square, to measure angles
- Understand the meaning and measure of a half rotation (180°) and a full rotation (360°)

Mathematics

Grade: 4

Domain: Geometry

Domain Description

Geometry refers to students' skill in understanding the characteristics of plane and solid geometric figures and using the coordinate system.

Standards Associated with Domain

M4G1

M4G2

M4G3

Associated Concepts, Skills, and Abilities

- Examine and compare angles in order to classify and identify triangles by their angles
- Describe parallel and perpendicular lines in plane geometric figures
- Examine and classify quadrilaterals (including parallelograms, squares, rectangles, trapezoids, and rhombi)
- Compare and contrast the relationships among quadrilaterals
- Compare and contrast a cube and a rectangular prism in terms of the number and shape of their faces, edges, and vertices
- Describe parallel and perpendicular lines and planes in connection with rectangular prisms
- Construct/collect models for solid geometric figures (cubes, prisms, cylinders, etc.)
- Understand and apply ordered pairs in the first quadrant of the coordinate system
- Locate a point in the first quadrant in the coordinate plane and name the ordered pair
- Graph ordered pairs in the first quadrant

Mathematics**Grade:** 4**Domain:** Algebra**Domain Description**

Algebra refers to students' skill in understanding and representing mathematical relationships between quantities using mathematical expressions in problem-solving situations.

Standard Associated with Domain

M4A1

Associated Concepts, Skills, and Abilities

- Understand and apply patterns and rules to describe relationships and solve problems
- Represent unknowns using symbols, such as \square and Δ
- Write and evaluate mathematical expressions using symbols and different values

Mathematics**Grade:** 4**Domain:** Data Analysis**Domain Description**

Data Analysis refers to students' skill in gathering, organizing, and displaying data. This domain also refers to students' skill in comparing features of graphs

Standard Associated with Domain

M4D1

Associated Concepts, Skills, and Abilities

- Represent data in bar, line, and pictographs
- Investigate the features and tendencies of graphs
- Compare different graphical representations for a given set of data
- Identify missing information and duplications in data

Mathematics

Grade: 4

Mathematical Process Skills

Mathematical Process Skills are integrated across the five domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M4P1

M4P2

M4P3

M4P4

M4P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics

Grade: 5

Domain: Number and Operations

Domain Description

Number and Operations refers to students' skill in further developing understanding of numbers, the meanings of multiplication and division of decimals, and the use of decimals and common fractions in computation and problem solving.

Standards Associated with Domain

M5N1

M5N2

M5N3

M5N4

M5N5

Associated Concepts, Skills, and Abilities

- Classify the set of counting numbers into subsets with distinguishing characteristics (odd/even, prime/composite)
- Find multiples and factors
- Analyze and use divisibility rules
- Understand place value
- Analyze the effect on the product when a number is multiplied by 10, 100, 1000, 0.1, and 0.01
- Model multiplication and division of decimals by another decimal
- Explain the process of multiplication and division, including situations in which the multiplier and divisor are both whole numbers and decimals
- Multiply and divide with decimals including decimals less than one and greater than one
- Understand that the relationships and rules for multiplication and division of whole numbers also apply to decimals
- Understand division of whole numbers can be represented as a fraction ($a/b = a \div b$)
- Understand the value of a fraction is not changed when both its numerator and denominator are multiplied or divided by the same number because it is the same as multiplying or dividing by one
- Find equivalent fractions and simplify fractions
- Model the multiplication and division of common fractions
- Explore finding common denominators using concrete, pictorial, and computational models
- Use $<$, $>$, or $=$ to compare fractions and justify the comparison
- Add and subtract common fractions and mixed numbers with unlike denominators
- Use fractions (proper and improper) and decimals interchangeably
- Estimate products and quotients
- Model percent on 10 by 10 grids
- Apply percentage to circle graphs

Mathematics

Grade: 5

Domain: Measurement

Domain Description

Measurement refers to students' skill in understanding and computing the areas of geometric plane figures, the volumes of simple geometric solids, and the measurement of capacity. This domain also refers to students' skill in converting measures from one unit to another within a system of measurement.

Standards Associated with Domain

M5M1

M5M3

M5M4

Associated Concepts, Skills, and Abilities

- Estimate the area of fundamental geometric plane figures
- Derive the formula for the area of a parallelogram (e.g., cut the parallelogram apart and rearrange it into a rectangle of the same area)
- Derive the formula for the area of a triangle (e.g. demonstrate and explain its relationship to the area of a rectangle with the same base and height)
- Find the areas of triangles and parallelograms using formulae
- Estimate the area of a circle through partitioning and tiling and then find the area of a circle with formula (let $\pi = 3.14$). (Discuss square units as they apply to circles.)
- Find the area of a polygon (regular and irregular) by dividing it into squares, rectangles, and/or triangles and finding the sum of the areas of those shapes
- Use milliliters, liters, fluid ounces, cups, pints, quarts, and gallons to measure capacity
- Compare one unit to another within a single system of measurement (e.g., 1 quart = 2 pints)
- Understand a cubic unit (u^3) is represented by a cube in which each edge has the length of 1 unit
- Identify the units used in computing volume as cubic centimeters (cm^3), cubic meters (m^3), cubic inches (in^3), cubic feet (ft^3), and cubic yards (yd^3)
- Derive the formula for finding the volume of a cube and a rectangular prism using manipulatives
- Compute the volume of a cube and a rectangular prism using formulae
- Estimate the volume of a simple geometric solid
- Understand the similarities and differences between volume and capacity

Mathematics**Grade: 5****Domain: Geometry****Domain Description**

Geometry refers to students' skill in understanding geometric figures, including congruence; the correspondence of their vertices, sides, and angles; and the relationship pi to circles.

Standards Associated with Domain

M5G1

M5G2

Associated Concepts, Skills, and Abilities

- Understand congruence of geometric figures and the correspondence of their vertices, sides, and angles
- Understand the relationship of the circumference of a circle, its diameter, and pi ($\pi = 3.14$)

Mathematics**Grade: 5****Domain: Algebra****Domain Description**

Algebra refers to students' skill in understanding, representing, and investigating mathematical expressions algebraically by using variables.

Standard Associated with Domain

M5A1

Associated Concepts, Skills, and Abilities

- Use variables, such as n or x , for unknown quantities in algebraic expressions
- Investigate simple algebraic expressions by substituting numbers for the unknown
- Determine that a formula will be reliable regardless of the type of number (whole numbers or decimal fractions) substituted for the variable

Mathematics**Grade: 5****Domain:** Data Analysis**Domain Description**

Data Analysis refers to students' skill in gathering, organizing, and displaying data. This domain also refers to students' skill in interpreting graphs.

Standards Associated with Domain

M5D1

M5D2

Associated Concepts, Skills, and Abilities

- Analyze data presented in a graph
- Compare and contrast multiple graphic representations (circle graphs, line graphs, bar graphs, etc.) for a single set of data and discuss the advantages/disadvantages of each
- Collect, organize, and display data using the most appropriate graph

Mathematics

Grade: 5

Mathematical Process Skills

Mathematical Process Skills are integrated across the five domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways

Standards Associated with Domain

M5P1

M5P2

M5P3

M5P4

M5P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics**Grade:** 6**Domain:** Number and Operations**Domain Description**

Number and Operations refers to students' skill in understanding the meaning of the four arithmetic operations as related to positive rational numbers, and applying these concepts and associated skills in real world situations.

Standard Associated with Domain

M6N1

Associated Concepts, Skills, and Abilities

- Apply factors and multiples
- Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic)
- Determine the greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers
- Add and subtract fractions and mixed numbers with unlike denominators
- Multiply and divide fractions and mixed numbers
- Use fractions, decimals, and percents interchangeably
- Solve problems involving fractions, decimals, and percents

Mathematics

Grade: 6

Domain: Measurement

Domain Description

Measurement refers to students' skill in determining the volume and surface area of solid figures, understanding and using the customary and metric systems of measurement to measure quantities efficiently and to represent volume and surface area appropriately.

Standards Associated with Domain

M6M1

M6M2

M6M3

M6M4

Associated Concepts, Skills, and Abilities

- Convert units within one system of measurement by using proportional relationships
- Measure length to the nearest half, fourth, eighth, and sixteenth of an inch
- Select appropriate size and type of units to measure length, perimeter, area, and volume
- Compare and contrast units of measure for perimeter, area, and volume
- Determine the formula for finding the volume of fundamental solid figures (right rectangular prisms, cylinders, pyramids and cones)
- Compute the volume of fundamental solid figures (right rectangular prisms, cylinders, pyramids and cones), using appropriate units of measure
- Estimate the volumes of geometric solid regions
- Solve application problems involving the volume of solid figures
- Find the surface area of right rectangular prisms and cylinders using manipulatives and constructing nets
- Determine the surface area of right rectangular prisms and cylinders using formula
- Estimate the surface areas of simple geometric solids
- Solve application problems involving surface area of right rectangular prisms and cylinders

Mathematics

Grade: 6

Domain: Geometry

Domain Description

Geometry refers to students' skill in further developing understanding of plane and solid geometric figures, incorporating the use of appropriate technology, and using this knowledge to solve authentic problems.

Standards Associated with Domain

M6G1

M6G2

Associated Concepts, Skills, and Abilities

- Determine and use lines of symmetry
- Comprehend the meaning of rotational symmetry including degree of rotation
- Use concepts of ratio, proportion, and scale to understand relationships between similar plane figures
- Interpret and sketch simple scale drawings
- Solve problems involving scale drawings
- Compare and contrast right prisms and pyramids
- Compare and contrast cylinders and cones
- Interpret and sketch front, back, top, bottom, and side views of solid figures
- Construct nets for prisms, cylinders, pyramids, and cones

Mathematics

Grade: 6

Domain: Algebra

Domain Description

Algebra refers to students' skill in investigating relationships between two quantities, writing and solving proportions and simple one-step equations that result from problem situations.

Standards Associated with Domain

M6A1

M6A2

M6A3

Associated Concepts, Skills, and Abilities

- Understand the concept of ratio and use it to represent quantitative relationships
- Analyze and describe patterns to determine mathematical rules, tables, and graphs
- Use manipulatives or draw pictures to solve problems involving proportional relationships
- Use proportions ($a/b = c/d$) to describe relationships and solve problems including percent problems
- Describe proportional relationships mathematically using $y = kx$, where k is the constant of proportionality
- Graph proportional relationships in the form $y = kx$ and describe characteristics of the graphs
- In a proportional relationship expressed as $y = kx$, solve for one quantity given values of the other two. Given quantities may be whole numbers, decimals, or fractions. Solve problems using the relationship $y = kx$
- Use proportional reasoning ($a/b = c/d$ and $y = kx$) to solve problems
- Evaluate algebraic expressions, including those with exponents, and solve simple one-step equations using the four basic operations

Mathematics

Grade: 6

Domain: Data Analysis and Probability

Domain Description

Data Analysis and Probability refers to students' skill in demonstrating an understanding of data analysis by posing questions to be answered by collecting data, representing, investigating, and using data to answer those questions, and understanding experimental and theoretical probability.

Standards Associated with Domain

M6D1

M6D2

Associated Concepts, Skills, and Abilities

- Formulate questions that can be answered by data collected by using samples from a large population (surveys) or by conducting experiments
- Use data to construct frequency distributions, tables, and graphs using data
- Choose appropriate graphs to be consistent with the nature of the data (categorical or numerical). Graphs should include pictographs, histograms, bar graphs, line graphs, circle graphs, and line plots
- Use tables and graphs to determine variation that occurs within a group and variation that occurs between groups
- Relate the data analysis to the context of the question posed
- Predict the probability of a given event through trials/simulations (experimental probability), and represent the probability as a ratio
- Determine, and use a ratio to represent, the theoretical probability of a given event
- Discover that experimental probability approaches theoretical probability when the number of trials is large

Mathematics

Grade: 6

Mathematical Process Skills

Mathematical Process Skills are integrated into the five domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills involve solving problems that arise in mathematics and in other contexts; investigating, developing, and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M6P1

M6P2

M6P3

M6P4

M6P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Understand that reasoning and proof are important aspects of mathematics
- Investigate mathematical conjectures
- Develop mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize mathematical thinking through communication
- Formulate mathematical thinking coherently
- Communicate the language of mathematics to express mathematical ideas precisely
- Identify and use connections among mathematical ideas
- Comprehend how mathematical ideas interconnect and build on one another
- Recognize and apply mathematics in contexts outside of mathematics
- Create representations to organize, record, and communicate mathematical ideas
- Translate mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics**Grade:** 7**Domain:** Number and Operations**Domain Description**

Number and Operations refers to students' skill in developing an understanding of the concept of rational numbers and applying them to real world situations.

Standard Associated with Domain

M7N1

Associated Concepts, Skills, and Abilities

- Find the absolute value of a number and understand it as the distance from zero on a number line
- Compare and order rational numbers, including repeating decimals
- Add, subtract, multiply, and divide positive and negative rational numbers
- Solve problems using rational numbers

Mathematics

Grade: 7

Domain: Geometry

Domain Description

Geometry refers to students' skill in further developing an understanding of plane and solid geometric figures through the use of constructions and transformations, exploring the properties of similarity, and further developing their understanding of 3-dimensional figures.

Standards Associated with Domain

M7G1

M7G2

M7G3

M7G4

Associated Concepts, Skills, and Abilities

- Perform basic constructions using both compass and straight edge and appropriate technology. Constructions should include copying a segment or an angle; bisecting a segment or an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line from a point not on the line
- Recognize that many constructions are based on the creation of congruent triangles
- Demonstrate understanding of translations, dilations, rotations, and reflections, and relate symmetry to appropriate transformations
- Determine the coordinates resulting from translation, dilation, rotation, or reflection of a figure in the coordinate plane
- Understand the meaning of similarity, visually compare geometric figures for similarity, and describe similarities by listing corresponding parts
- Understand the relationships among scale factors, length ratios, and area ratios of similar geometric figures, and use them to determine the side lengths and areas of similar geometric figures
- Understand congruence of geometric figures as a special case of similarity in which figures have the same size and shape
- Describe the three-dimensional figures formed by the translations and rotations of plane figures through space
- Sketch, model, and describe the cross-section of a cone, a cylinder, a pyramid, and a prism

Mathematics

Grade: 7

Domain: Algebra

Domain Description

Algebra refers to students' skill in developing an understanding of linear relations and fundamental algebraic concepts.

Standards Associated with Domain

M7A1

M7A2

M7A3

Associated Concepts, Skills, and Abilities

- Translate verbal phrases into algebraic expressions
- Simplify and evaluate algebraic expressions using commutative, associative, and distributive properties where appropriate
- Add and subtract linear expressions
- Define a variable, write and solve an equation, and interpret the solution of a given problem
- Use the addition and multiplication properties of equality to solve one- and two-step linear equations
- Plot points on a coordinate plane
- Represent, describe, and analyze relations from tables, graphs, and formulas
- Describe how change in one variable affects another variable
- Describe patterns in the graphs of proportional relationships, both direct ($y = kx$) and inverse ($y = k/x$)

Mathematics

Grade: 7

Domain: Data Analysis and Probability

Domain Description

Data Analysis and Probability refers to students' skill in developing an understanding of data analysis by posing questions, collecting data, analyzing the data using measures of central tendency and variation, using the data to answer the questions posed, and understanding the role of probability in sampling.

Standard Associated with Domain

M7D1

Associated Concepts, Skills, and Abilities

- Formulate questions and collect data from a census of at least 30 objects and from samples of varying sizes
- Construct frequency distributions
- Analyze data to determine measures of central tendency (mean, median, and mode) and measures of variation (range, quartiles, and interquartile range)
- Compare measures of central tendency and variation from samples to those from a census and observe that sample statistics are more likely to approximate the population parameters as sample size increases
- Analyze data using appropriate graphs, including pictographs, histograms, bar graphs, line graphs, circle graphs, the line plots introduced earlier, box-and-whisker plots, and scatter plots
- Analyze and draw conclusions about data, and use data to describe the relationship between two variables

Mathematics

Grade: 7

Mathematical Process Skills

Mathematical Process Skills are integrated across the four domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M7P1

M7P2

M7P3

M7P4

M7P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Understand that reasoning and proof are fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize mathematical thinking through communication
- Communicate mathematical thinking coherently and clearly
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Comprehend how mathematical ideas interconnect and build on one another
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

Mathematics

Grade: 8

Domain: Number and Operations

Domain Description

Number and Operations refers to students' skill in using different representations of numbers including square roots, exponents, and scientific notation.

Standard Associated with Domain

M8N1

Associated Concepts, Skills, and Abilities

- Find square roots of perfect squares
- Recognize the (positive) square root of a number as a length of a side of a square with a given area
- Recognize square roots as points and as lengths on a number line
- Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign
- Recognize and use the radical symbol to denote the positive square root of a positive number
- Estimate square roots of positive numbers
- Simplify, add, subtract, multiply, and divide expressions containing square roots
- Distinguish between rational and irrational numbers
- Simplify expressions containing integer exponents
- Express and use numbers in scientific notation
- Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation

Mathematics**Grade:** 8**Domain:** Geometry**Domain Description**

Geometry refers to students' skill in using and applying geometric properties of plane figures, including parallel and perpendicular lines, congruence, and the Pythagorean theorem.

Standards Associated with Domain

M8G1

M8G2

Associated Concepts, Skills, and Abilities

- Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically
- Apply properties of angle pairs formed by parallel lines cut by a transversal
- Understand the properties of the ratio of segments of parallel lines cut by one or more transversals
- Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent
- Apply properties of right triangles, including the Pythagorean theorem
- Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle

Mathematics

Grade: 8

Domain: Algebra

Domain Description

Algebra refers to students' skill in using linear algebra to represent, analyze, and solve problems. This domain also refers to students' skill in using equations, tables, and graphs to investigate linear relations and functions, paying particular attention to slope as rate of change.

Standards Associated with Domain

M8A1

M8A2

M8A3

M8A4

M8A5

Associated Concepts, Skills, and Abilities

- Represent a given situation using algebraic expressions or equations in one variable
- Simplify and evaluate algebraic expressions
- Solve algebraic equations in one variable, including equations involving absolute values
- Solve equations involving several variables for one variable in terms of the others
- Interpret solutions in problem contexts
- Represent a given situation using an inequality in one variable
- Use the properties of inequality to solve inequalities
- Graph the solution of an inequality on a number line
- Interpret solutions in problem contexts
- Recognize a relation as a correspondence between varying quantities
- Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique
- Distinguish between relations that are functions and those that are not functions
- Recognize functions in a variety of representations and a variety of contexts
- Use tables to describe sequences recursively and with a formula in closed form
- Understand and recognize arithmetic sequences as linear functions with whole-number input values
- Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function
- Identify relations and functions as linear or nonlinear
- Translate among verbal, tabular, graphic, and algebraic representations of functions
- Interpret slope as a rate of change
- Determine the meaning of the slope and y -intercept in a given situation
- Graph equations of the form $y = mx + b$
- Graph equations of the form $ax + by = c$
- Graph the solution set of a linear inequality, identifying whether the solution set is an open or a closed half plane
- Determine the equation of a line given a graph, numerical information that defines the line, or a context involving a linear relationship

- Solve problems involving linear relationships
- Given a problem context, write an appropriate system of linear equations or inequalities
- Solve systems of equations graphically and algebraically, using technology as appropriate
- Graph the solution set of a system of linear inequalities in two variables
- Interpret solutions in problem contexts

Mathematics

Grade: 8

Domain: Data Analysis and Probability

Domain Description

Data Analysis and Probability refers to students' skill in understanding set theory and simple counting techniques, determining the theoretical probability of simple events, and making inferences from data, particularly data that can be modeled by linear functions.

Standards Associated with Domain

M8D1

M8D2

M8D3

M8D4

Associated Concepts, Skills, and Abilities

- Demonstrate relationships among sets through use of Venn diagrams
- Determine subsets, complements, intersection, and union of sets
- Use set notation to denote elements of a set
- Use tree diagrams to find the number of outcomes
- Apply the addition and multiplication principles of counting
- Find the probability of simple independent events
- Find the probability of compound independent events
- Gather data that can be modeled with a linear function
- Estimate and determine a line of best fit from a scatter plot

Mathematics

Grade: 8

Mathematical Process Skills

Mathematical Process Skills are integrated across the four domains.

Mathematical Process Skills refers to students' dexterity in applying concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge.

Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.

Standards Associated with Domain

M8P1

M8P2

M8P3

M8P4

M8P5

Associated Concepts, Skills, and Abilities

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving
- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof
- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others
- Use the language of mathematics to express mathematical ideas precisely
- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics
- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena