

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