Mathematics

Grades 6-8

Number Sense, Concepts, and Operations

Standard 1:

The student understands the different ways numbers are represented and used in the real world. (MA.A.1.3)

1. associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.
2. understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.
3. understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.
4. understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.

Standard 2:

The student understands number systems. (MA.A.2.3)

1. understands and uses exponential and scientific notation.
2. understands the structure of number systems other than the decimal number system.

Standard 3:

The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving. (MA.A.3.3)

1. understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.
2. selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.
3. adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.

Standard 4:

The student uses estimation in problem solving and computation. (MA.A.4.3)

1. uses estimation strategies to predict results and to check the reasonableness of results.

Standard 5:

The student understands and applies theories related to numbers. (MA.A.5.3)

1. uses concepts about numbers, including primes, factors, and multiples, to build number sequences.

Measurement

Standard 1:

The student measures quantities in the real world and uses the measures to solve problems. (MA.B.1.3)

1. uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.
2. uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.
3. understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.
4. constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.

Standard 2:

The student compares, contrasts, and converts within systems of measurement (both standard / nonstandard and metric / customary). (MA.B.2.3)

1. uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.
2. solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.

Standard 3:

The student estimates measurements in real-world problem situations. (MA.B.3.3)

1. solves real-world and mathematical problems involving estimates of measurements including length, time, weight / mass, temperature, money, perimeter, area, and volume, in either customary or metric units.

Standard 4:

The student selects and uses appropriate units and instruments for measurement to achieve the degree of precision and accuracy required in real-world situations. (MA.B.4.3)

1. selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement.)
2. selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.

Geometry and Spatial Sense

Standard 1:

The student describes, draws, identifies, and analyzes two- and three-dimensional shapes. (MA.C.1.3)

1. understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two and three dimensions.

Standard 2:

The student visualizes and illustrates ways in which shapes can be combined, subdivided, and changed. (MA.C.2.3)

1. understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.
2. predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).

Standard 3:

The student uses coordinate geometry to locate objects in both two and three dimensions and to describe objects algebraically. (MA.C.3.3)

1. represents and applies geometric properties and relationships to solve real-world and mathematical problems.
2. identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.

Algebraic Thinking

Standard 1:

The student describes, analyzes, and generalizes a wide variety of patterns, relations, and functions. (MA.D.1.3)

1. describes a wide variety of patterns, relationships, and functions through models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.
2. creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.

Standard 2:

The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations. (MA.D.2.3)

1. represents and solves real-world problems graphically, with algebraic expressions, equations, and inequalities.
2. uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.

Data Analysis and Probability

Standard 1:

The student understands and uses the tools of data analysis for managing information. (MA.E.1.3)

1. collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.
2. understands and applies the concepts of range and central tendency (mean, median, and mode).
3. analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.

Standard 2:

The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics. (MA.E.2.3)

1. compares experimental results with mathematical expectations of probabilities.
2. determines odds for and odds against a given situation.

Standard 3:

The student uses statistical methods to make inferences and valid arguments about real-world situations. (MA.E.3.3)

1. formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.
2. identifies the common uses and misuses of probability and statistical analysis in the everyday world.