

Mathematics Content Standards for California Public Schools	Boardworks Middle School Math Presentations
Grade 6	
Number Sense	
1.0 Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages:	
1.1 Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.	Ordering decimals Ordering fractions Fractions and decimals Equivalent fractions, decimals and percentage
1.2 Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (a/b , a to b , $a:b$).	Ratio and rate
1.3 Use proportions to solve problems (e.g., determine the value of N if $4/7 = N/21$, find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.	Using scale factors Finding missing lengths Ratio and proportion problems Comparing proportions
1.4 Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.	Calculating percentages mentally Calculating percentages on paper Calculating percentages with a calculator Percentage change Percentages and inverse operations
2.0 Students calculate and solve problems involving addition, subtraction, multiplication, and division:	
2.1 Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation.	Adding and subtracting simple fractions Methods for adding and subtracting fractions Multiplying fractions Dividing by fractions Finding a fraction of an amount

2.2 Explain the meaning of multiplication and division of positive fractions and perform the calculations.	Multiplying fractions Dividing by fractions
2.3 Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.	Adding and subtracting integers Adding and subtracting integers activities Using negative numbers in context Multiplying and dividing integers Divisibility Properties of numbers Mental addition and subtraction Mental multiplication Mental division Written methods for addition and subtraction Written methods for multiplication Written methods for division
2.4 Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).	GCF and LCM Multiples and factors Divisibility Methods for adding and subtracting fractions
Algebra and Functions	
1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results:	
1.1 Write and solve one-step linear equations in one variable.	Solving linear inequalities Writing expressions Introducing formulas
1.2 Write and evaluate an algebraic expression for a given situation, using up to three variables.	Introducing formulas Writing expressions
1.3 Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process.	Order of operations and PEMDAS Properties of numbers Solving simple equations

1.4 Solve problems manually by using the correct order of operations or by using a scientific calculator.	Order of operations and PEMDAS Properties of numbers Solving simple equations
2.0 Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions:	
2.1 Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).	Converting metric units Customary unit conversions
2.2 Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.	Ratio and rate
2.3 Solve problems involving rates, average speed, distance, and time.	Ratio and rate Distance-time graphs
3.0 Students investigate geometric patterns and describe them algebraically:	
3.1 Use variables in expressions describing geometric quantities (e.g., $P = 2w + 2l$, $A = 1/2 bh$, $C = \pi d$ —the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively).	Using formulas Perimeter Area Area problems Circumference of a circle
3.2 Express in symbolic form simple relationships arising from geometry.	Using formulas
Measurement and Geometry	
1.0 Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems:	
1.1 Understand the concept of a constant such as π ; know the formulas for the circumference and area of a circle.	Circumference of a circle Area of a circle
1.2 Know common estimates of π (3.14; $22/7$) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements.	Circumference of a circle Area of a circle
1.3 Know and use the formulas for the volume of triangular prisms and cylinders (area of base \times height); compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid.	Volume Cylinders, cones and spheres
2.0 Students identify and describe the properties of two-dimensional figures:	
2.1 Identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms.	Calculating angles

2.2 Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle.	Calculating angles Angles in a triangle Angles in polygons
2.3 Draw quadrilaterals and triangles from given information about them (e.g., a quadrilateral having equal sides but no right angles, a right isosceles triangle).	Quadrilaterals Triangles Constructing triangles
Statistics, Data Analysis, and Probability	
1.0 Students compute and analyze statistical measurements for data sets:	
1.1 Compute the range, mean, median, and mode of data sets.	Finding the mode Finding the median Finding the range Calculating the mean
1.2 Understand how additional data added to data sets may affect these computations of measures of central tendency.	-
1.3 Understand how the inclusion or exclusion of outliers affects measures of central tendency.	Calculating statistics
1.4 Know why a specific measure of central tendency (mean, median, mode) provides the most useful information in a given context.	Calculating statistics
2.0 Students use data samples of a population and describe the characteristics and limitations of the samples:	
2.1 Compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.	-
2.2 Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.	Population and sampling
2.3 Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.	Collecting data Misleading graphs
2.4 Identify data that represent sampling errors and explain why the sample (and the display) might be biased.	Population and sampling
2.5 Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.	-

3.0 Students determine theoretical and experimental probabilities and use these to make predictions about events:	
3.1 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.	Probability diagrams
3.2 Use data to estimate the probability of future events (e.g., batting averages or number of accidents per mile driven).	Experimental probability
3.3 Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if P is the probability of an event, 1-P is the probability of an event not occurring.	Calculating probability part 1 The probability scale
3.4 Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities.	Calculating probability part 2
3.5 Understand the difference between independent and dependent events.	-
Grade 7	
Number Sense	
1.0 Students know the properties of, and compute with, rational numbers expressed in a variety of forms:	
1.1 Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.	Scientific notation Ordering decimals Ordering fractions Fractions and decimals Equivalent fractions, decimals and percentage

<p>1.2 Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.</p>	<p>Adding and subtracting integers Adding and subtracting integers activities Using negative numbers in context Multiplying and dividing integers Divisibility Properties of numbers Mental addition and subtraction Mental multiplication Mental division Written methods for addition and subtraction Written methods for multiplication Written methods for division Adding and subtracting simple fractions Methods for adding and subtracting fractions Multiplying fractions Dividing by fractions Multiplying and dividing by 0.1 and 0.01 Multiplying by numbers between 0 and 1 Mental math and place value Mental math puzzles Powers</p>
<p>1.3 Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.</p>	<p>Equivalent fractions, decimals and percentages Introducing percentages Fractions and decimals</p>
<p>1.4 Differentiate between rational and irrational numbers.</p>	<p>Rational and irrational numbers</p>
<p>1.5 Know that every rational number is either a terminating or repeating decimal and be able to convert terminating decimals into reduced fractions.</p>	<p>Rational and irrational numbers Fractions and decimals</p>
<p>1.6 Calculate the percentage of increases and decreases of a quantity.</p>	<p>Percentage change Percentages and inverse operations</p>

1.7 Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.	Percentage change Percentages and inverse operations Calculating percentages mentally Calculating percentages on paper Calculating percentages with a calculator
2.0 Students use exponents, powers, and roots and use exponents in working with fractions:	
2.1 Understand negative whole-number exponents. Multiply and divide expressions involving exponents with a common base.	Powers
2.2 Add and subtract fractions by using factoring to find common denominators.	Adding and subtracting simple fractions Methods for adding and subtracting fractions Prime factorization Multiples and factors
2.3 Multiply, divide, and simplify rational numbers by using exponent rules.	Powers
2.4 Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.	Square roots Estimation and approximation
2.5 Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers.	Absolute value
Algebra and Functions	
1.0 Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:	
1.1 Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).	Writing expressions Solving linear inequalities Introducing formulas
1.2 Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$	Order of operations and PEMDAS
1.3 Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used.	Properties of numbers
1.4 Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly.	Writing expressions Inequalities
1.5 Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.	Direct variations Interpreting graphs Distance-time graphs Conversion graphs
2.0 Students interpret and evaluate expressions involving integer powers and simple roots:	

2.1 Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.	Powers Order of operations and PEMDAS
2.2 Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.	Square roots
3.0 Students graph and interpret linear and some nonlinear functions:	
3.1 Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.	Graphs of nonlinear functions Exploring nonlinear graphs
3.2 Plot the values from the volumes of three-dimensional shapes for various values of the edge lengths (e.g., cubes with varying edge lengths or a triangle prism with a fixed height and an equilateral triangle base of varying lengths).	-
3.3 Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.	Graphs of functions The equation of a straight line
3.4 Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of the line equals the quantities.	Conversion graphs
4.0 Students solve simple linear equations and inequalities over the rational numbers:	
4.1 Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.	Solving linear inequalities Solving simple equations Multiplying algebraic terms Dividing algebraic terms Factoring expressions Combining like terms
4.2 Solve multistep problems involving rate, average speed, distance, and time or a direct variation.	Direct variations

Measurement and Geometry	
1.0 Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:	
1.1 Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).	Customary unit conversions Converting metric units
1.2 Construct and read drawings and models made to scale.	Scale drawings
1.3 Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.	-
2.0 Students compute the perimeter, area, and volume of common geometric objects and use the results to find measures of less common objects. They know how perimeter, area, and volume are affected by changes of scale:	
2.1 Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.	Perimeter Area Area problems Using formulas Surface area Volume Circumference of a circle Area of a circle Cylinders, cones and spheres
2.2 Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.	Area of irregular shapes Area problems Surface area Volume Circumference of a circle Area of a circle
2.3 Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor.	-
2.4 Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or $[1 \text{ ft}^2] = [144 \text{ in}^2]$, 1 cubic inch is approximately 16.38 cubic centimeters or $[1 \text{ in}^3] = [16.38 \text{ cm}^3]$).	Customary unit conversions Converting metric units

3.0 Students know the Pythagorean theorem and deepen their understanding of plane and solid geometric shapes by constructing figures that meet given conditions and by identifying attributes of figures:	
3.1 Identify and construct basic elements of geometric figures (e.g., altitudes, midpoints, diagonals, angle bisectors, and perpendicular bisectors; central angles, radii, diameters, and chords of circles) by using a compass and straightedge.	Constructing lines and angles Circles Drawing lines and angles
3.2 Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections.	Quadrilaterals on a coordinate grid Translation Reflection Introducing coordinates Finding the midpoint of a line segment
3.3 Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.	Pythagorean Theorem Identifying right triangles Pythagorean triples Calculating sides of right triangles

3.4 Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures.	Congruence Finding missing lengths
3.5 Construct two-dimensional patterns for three-dimensional models, such as cylinders, prisms, and cones.	Constructing nets
3.6 Identify elements of three-dimensional geometric objects (e.g., diagonals of rectangular solids) and describe how two or more objects are related in space (e.g., skew lines, the possible ways three planes might intersect).	-
Statistics, Data Analysis, and Probability	
1.0 Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set by hand and through the use of an electronic spreadsheet software program:	
1.1 Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.	Appropriate graphs Quartiles and box plots Calculating statistics Comparing data
1.2 Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).	Scatter plots
1.3 Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.	Interquartile range Quartiles and box plots Finding the median