

Georgia Performance Standards Mathematics	Boardworks Middle School Math Presentations
Grade 6	
NUMBER AND OPERATIONS	
M6N1. Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.	
a. Apply factors and multiples.	Multiples and factors
b. Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic).	Prime numbers Prime factorization
c. Determine the greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers.	GCF and LCM
d. Add and subtract fractions and mixed numbers with unlike denominators.	Adding and subtracting simple fractions Methods for adding and subtracting fractions
e. Multiply and divide fractions and mixed numbers.	Multiplying fractions Dividing by fractions Finding a fraction of an amount
f. Use fractions, decimals, and percents interchangeably.	Equivalent fractions, decimals and percentages Calculating probability part 1 The probability scale Introducing percentages Fractions and decimals Calculating percentages with a calculator Calculating percentages on paper

g. Solve problems involving fractions, decimals, and percents.	Calculating percentages mentally Calculating percentages with a calculator Calculating percentages on paper Percentage change Percentages and inverse operations Adding and subtracting simple fractions Methods for adding and subtracting fractions Multiplying fractions Dividing by fractions Mental math and place value Multiplying by numbers between 0 and 1 Multiplying and dividing by 0.1 and 0.01 Mental math puzzles Mental addition and subtraction Mental multiplication Mental division
MEASUREMENT	
M6M1. Students will convert from one unit to another within one system of measurement (customary or metric) by using proportional relationships.	Customary unit conversions Converting metric units Ratio and proportion problems
M6M2. Students will use appropriate units of measure for finding length, perimeter, area and volume and will express each quantity using the appropriate unit.	
a. Measure length to the nearest half, fourth, eighth and sixteenth of an inch.	-
b. Select and use units of appropriate size and type to measure length, perimeter, area and volume.	Customary unit conversions Converting metric units Perimeter Area Volume

c. Compare and contrast units of measure for perimeter, area, and volume.	Perimeter Area Volume
M6M3. Students will determine the volume of fundamental solid figures (right rectangular prisms, cylinders, pyramids and cones).	
a. Determine the formula for finding the volume of fundamental solid figures.	Volume Cylinders, cones and spheres Using formulas Formulas for shapes
b. Compute the volumes of fundamental solid figures, using appropriate units of measure.	Volume Cylinders, cones and spheres Using formulas
c. Estimate the volumes of simple geometric solids.	Volume
d. Solve application problems involving the volume of fundamental solid figures.	Volume Cylinders, cones and spheres Using formulas
M6M4. Students will determine the surface area of solid figures (right rectangular prisms and cylinders).	
a. Find the surface area of right rectangular prisms and cylinders using manipulatives and constructing nets.	Surface area Constructing nets Cylinders, cones and spheres
b. Compute the surface area of right rectangular prisms and cylinders using formulae.	Surface area Constructing nets Cylinders, cones and spheres
c. Estimate the surface areas of simple geometric solids.	-
d. Solve application problems involving surface area of right rectangular prisms and cylinders.	Surface area Constructing nets Cylinders, cones and spheres

GEOMETRY	
M6G1. Students will further develop their understanding of plane figures.	
a. Determine and use lines of symmetry.	Reflection symmetry
b. Investigate rotational symmetry, including degree of rotation.	Rotational symmetry
c. Use the concepts of ratio, proportion and scale factor to demonstrate the relationships between similar plane figures.	Dilation Using scale factors
d. Interpret and sketch simple scale drawings.	Scale drawings
e. Solve problems involving scale drawings.	Scale drawings
M6G2. Students will further develop their understanding of solid figures.	
a. Compare and contrast right prisms and pyramids.	-
b. Compare and contrast cylinders and cones.	Cylinders, cones and spheres
c. Interpret and sketch front, back, top, bottom and side views of solid figures.	Views of 3-D shapes
d. Construct nets for prisms, cylinders, pyramids, and cones.	Constructing nets
ALGEBRA	
M6A1. Students will understand the concept of ratio and use it to represent quantitative relationships.	Ratio and rate Dividing in a given ratio
M6A2. Students will consider relationships between varying quantities.	
	Introducing sequences Sequences from geometrical patterns Describing and continuing sequences Generating sequences from flow charts Generating sequences and rules Function machines Mapping functions Graphs of functions The equation of a straight line
a. Analyze and describe patterns arising from mathematical rules, tables, and graphs.	Ratio and rate Dividing in a given ratio
b. Use manipulatives or draw pictures to solve problems involving proportional relationships.	Ratio and rate Dividing in a given ratio
c. Use proportions ($a/b=c/d$) to describe relationships and solve problems, including percent problems.	Comparing proportions

d. Describe proportional relationships mathematically using $y = kx$, where k is the constant of proportionality.	Direct variations
e. Graph proportional relationships in the form $y = kx$ and describe characteristics of the graphs.	Direct variations
f. 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 $y = kx$.	Transforming formulas Direct variations
g. Use proportional reasoning ($a/b=c/d$ and $y = kx$) to solve problems.	Direct variations Comparing proportions
M6A3. Students will evaluate algebraic expressions, including those with exponents, and solve simple one-step equations using each of the four basic operations.	Solving simple equations Nonlinear equations Nonlinear equations and spreadsheets
DATA ANALYSIS AND PROBABILITY	
M6D1. Students will pose questions, collect data, represent and analyze the data, and interpret results.	
a. Formulate questions that can be answered by data. Students should collect data by using samples from a larger population (surveys), or by conducting experiments.	Population and sampling Collecting data
b. Using data, construct frequency distributions, frequency tables, and graphs.	Organizing data Reading and plotting graphs Appropriate graphs
c. 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.	Appropriate graphs Histograms Bar graphs Line graphs Circle graphs
d. Use tables and graphs to examine variation that occurs within a group and variation that occurs between groups.	Appropriate graphs Histograms Bar graphs Line graphs Circle graphs

e. Relate the data analysis to the context of the questions posed.	Appropriate graphs Histograms Bar graphs Line graphs Circle graphs
M6D2. Students will use experimental and simple theoretical probability and understand the nature of sampling. They will also make predictions from investigations.	
a. Predict the probability of a given event through trials/simulations (experimental probability), and represent the probability as a ratio.	Experimental probability
b. Determine, and use a ratio to represent, the theoretical probability of a given event.	Calculating probability part 1
c. Discover that experimental probability approaches theoretical probability when the number of trials is large.	Experimental probability
Grade 7	
NUMBER AND OPERATIONS	
M7N1. Students will understand the meaning of positive and negative rational numbers and use them in computation.	
a. Find the absolute value of a number and understand it as the distance from zero on a number line.	Absolute value
b. Compare and order rational numbers, including repeating decimals.	Ordering decimals Ordering integers Ordering fractions Equivalent fractions Fractions and decimals Introducing percentages Equivalent fractions, decimals and percentages

<p>c. Add, subtract, multiply, and divide positive and negative rational numbers.</p>	<p>Adding and subtracting integers Adding and subtracting integers activities Multiplying and dividing integers 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 Finding a fraction of an amount Multiplying fractions Dividing by fractions Mental math and place value Multiplying by numbers between 0 and 1 Multiplying and dividing by 0.1 and 0.01 Mental math puzzles</p>
<p>d. Solve problems using rational numbers.</p>	<p>Mental math puzzles Adding and subtracting integers activities Finding a fraction of an amount</p>

GEOMETRY	
M7G1. Students will construct plane figures that meet given conditions.	
a. Perform basic constructions using both compass and straight edge, and appropriate technology. Constructions should include copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	Drawing lines and angles Constructing lines and angles Parallel and perpendicular lines
M7G2. Students will demonstrate understanding of transformations.	
a. Demonstrate understanding of translations, dilations, rotations, reflections, and relate symmetry to appropriate transformations.	Translation Dilation Rotation Reflection Reflection symmetry Rotational symmetry Combining transformations
b. Given a figure in the coordinate plane, determine the coordinates resulting from a translation, dilation, rotation, or reflection.	Translation Dilation Rotation Reflection Combining transformations
M7G3. Students will use the properties of similarity and apply these concepts to geometric figures.	
a. Understand the meaning of similarity, visually compare geometric figures for similarity, and describe similarities by listing corresponding parts.	Congruence Dilation
b. Understand the relationships among scale factors, length ratios, and area ratios between similar figures. Use scale factors, length ratios, and area ratios to determine side lengths and areas of similar geometric figures.	Using scale factors Finding missing lengths
c. Understand congruence of geometric figures as a special case of similarity: The figures have the same size and shape.	Congruence

M7G4. Students will further develop their understanding of three-dimensional figures.	
a. Describe three-dimensional figures formed by translations and rotations of plane figures through space.	-
b. Sketch, model, and describe cross-sections of cones, cylinders, pyramids, and prisms.	Cross sections
ALGEBRA	
M7A1. Students will represent and evaluate quantities using algebraic expressions.	
a. Translate verbal phrases to algebraic expressions.	Writing expressions
b. Simplify and evaluate algebraic expressions, using commutative, associative, and distributive properties as appropriate.	Properties of numbers Solving simple equations Substitution Factoring expressions
c. Add and subtract linear expressions.	Combining like terms Solving simple equations
M7A2. Students will understand and apply linear equations in one variable.	
a. Given a problem, define a variable, write an equation, solve the equation, and interpret the solution.	Writing expressions Introducing formulas
b. Use the addition and multiplication properties of equality to solve one- and two-step linear equations.	Solving simple equations
M7A3. Students will understand relationships between two variables.	
a. Plot points on a coordinate plane.	Introducing coordinates Reading and plotting graphs Graphs of functions
b. Represent, describe, and analyze relations from tables, graphs, and formulas.	Mapping functions Graphs of functions Function notation and relations The equation of a straight line

c. Describe how change in one variable affects the other variable.	Direct variations Mapping functions Graphs of functions
d. Describe patterns in the graphs of proportional relationships, both direct ($y = kx$) and inverse ($y = k/x$).	Direct variations Exploring nonlinear graphs
DATA ANALYSIS AND PROBABILITY	
M7D1. Students will pose questions, collect data, represent and analyze the data, and interpret results.	
a. Formulate questions and collect data from a census of at least 30 objects and from samples of varying sizes.	Collecting data
b. Construct frequency distributions.	-
c. Analyze data using measures of central tendency (mean, median, and mode), including recognition of outliers.	Calculating the mean Finding the median Finding the mode Calculating statistics
d. Analyze data with respect to measures of variation (range, quartiles, interquartile range).	Finding the range Interquartile range Quartiles and box plots
e. Compare measures of central tendency and variation from samples to those from a census. Observe that sample statistics are more likely to approximate the population parameters as sample size increases.	-
f. Analyze data using appropriate graphs, including pictographs, histograms, bar graphs, line graphs, circle graphs, and line plots introduced earlier, and using box and- whisker plots and scatter plots.	Appropriate graphs Histograms Bar graphs Line graphs Circle graphs Quartiles and box plots Scatter plots
g. Analyze and draw conclusions about data, including describing the relationship between two variables.	-

Grade 8	
NUMBER AND OPERATIONS	
M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.	
a. Find square roots of perfect squares.	Square roots
b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.	Square roots
c. Recognize square roots as points and as lengths on a number line.	Estimation and approximation
d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.	Square roots
e. Recognize and use the radical symbol to denote the positive square root of a positive number.	-
f. Estimate square roots of positive numbers.	Square roots Estimation and approximation
g. Simplify, add, subtract, multiply, and divide expressions containing square roots.	-
h. Distinguish between rational and irrational numbers.	Rational and irrational numbers
i. Simplify expressions containing integer exponents.	Powers
j. Express and use numbers in scientific notation.	Scientific notation
k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.	Square roots Nonlinear equations Nonlinear equations and spreadsheets Scientific notation

GEOMETRY	
M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence.	
a. Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically.	Parallel and perpendicular lines Systems of linear equations
b. Apply properties of angle pairs formed by parallel lines cut by a transversal.	Angles made with parallel lines
c. Understand the properties of the ratio of segments of parallel lines cut by one or more transversals.	-
d. Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.	Congruence
M8G2. Students will understand and use the Pythagorean theorem.	
a. Apply properties of right triangles, including the Pythagorean theorem.	Pythagorean Theorem Identifying right triangles Calculating sides of right triangles
b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.	Pythagorean Theorem
ALGEBRA	
M8A1. Students will use algebra to represent, analyze, and solve problems.	
a. Represent a given situation using algebraic expressions or equations in one variable.	Writing expressions Deriving formulas Sequences from practical contexts
b. Simplify and evaluate algebraic expressions.	Solving simple equations Combining like terms Multiplying algebraic terms Dividing algebraic terms Factoring expressions Using formulas
c. Solve algebraic equations in one variable, including equations involving absolute values.	Solving simple equations
d. Solve equations involving several variables for one variable in terms of the others.	Transforming formulas
e. Interpret solutions in problem contexts.	Introducing formulas Using formulas Sequences from practical contexts

M8A2. Students will understand and graph inequalities in one variable.	
a. Represent a given situation using an inequality in one variable.	Solving linear inequalities
b. Use the properties of inequality to solve inequalities.	Integer solutions for inequalities Solving linear inequalities
c. Graph the solution of an inequality on a number line.	Inequalities on a number line Combined linear inequalities
d. Interpret solutions in problem contexts.	Solving linear inequalities Inequalities on a number line
M8A3. Students will understand relations and linear functions.	
a. Recognize a relation as a correspondence between varying quantities.	Function notation and relations
b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.	Function notation and relations Function machines
c. Distinguish between relations that are functions and those that are not functions.	Function notation and relations
d. Recognize functions in a variety of representations and a variety of contexts.	Function notation and relations Function machines Mapping functions Graphs of functions
e. Use tables to describe sequences recursively and with a formula in closed form.	Generating sequences and rules
f. Understand and recognize arithmetic sequences as linear functions with whole number input values.	Describing and continuing sequences
g. Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function.	-
h. Identify relations and functions as linear or nonlinear.	The equation of a straight line Graphs of functions Graphs of nonlinear functions Exploring nonlinear graphs
i. Translate among verbal, tabular, graphic, and algebraic representations of functions.	Mapping functions Graphs of functions Function machines Function notation and relations

M8A4. Students will graph and analyze graphs of linear equations and inequalities.	
a. Interpret slope as a rate of change.	Direct variations Distance-time graphs The equation of a straight line
b. Determine the meaning of the slope and y-intercept in a given situation.	The equation of a straight line
c. Graph equations of the form $y = mx + b$.	The equation of a straight line
d. Graph equations of the form $ax + by = c$.	-
e. Graph the solution set of a linear inequality, identifying whether the solution set is an open or a closed half-plane.	Inequalities and regions
f. Determine the equation of a line given a graph, numerical information that defines the line or a context involving a linear relationship.	Direct variations The equation of a straight line Graphs of functions
g. Solve problems involving linear relationships.	Direct variations The equation of a straight line
M8A5. Students will understand systems of linear equations and inequalities and use them to solve problems.	
a. Given a problem context, write an appropriate system of linear equations or inequalities.	-
b. Solve systems of equations graphically and algebraically, using technology as appropriate.	Systems of linear equations
c. Graph the solution set of a system of linear inequalities in two variables.	Inequalities and regions
d. Interpret solutions in problem contexts.	-
DATA ANALYSIS AND PROBABILITY	
M8D1. Students will apply basic concepts of set theory.	
a. Demonstrate relationships among sets through use of Venn diagrams.	Venn diagrams
b. Determine subsets, complements, intersection, and union of sets.	Venn diagrams
c. Use set notation to denote elements of a set.	-

M8D2. Students will determine the number of outcomes related to a given event.	
a. Use tree diagrams to find the number of outcomes.	Probability diagrams
b. Apply the addition and multiplication principles of counting.	Probability diagrams
M8D3. Students will use the basic laws of probability.	
a. Find the probability of simple independent events.	Calculating probability part 1
b. Find the probability of compound independent events.	Probability diagrams
M8D4. Students will organize, interpret, and make inferences from statistical data	
a. Gather data that can be modeled with a linear function.	-
b. Estimate and determine a line of best fit from a scatter plot.	Scatter plots