

## ***6-8 Mathematics Georgia Performance Standards***

### **K-12 Mathematics Introduction**

The Georgia Mathematics Curriculum focuses on actively engaging the students in the development of mathematical understanding by using manipulatives and a variety of representations, working independently and cooperatively to solve problems, estimating and computing efficiently, and conducting investigations and recording findings. There is a shift towards applying mathematical concepts and skills in the context of authentic problems and for the student to understand concepts rather than merely follow a sequence of procedures. In mathematics classrooms, students will learn to think critically in a mathematical way with an understanding that there are many different ways to a solution and sometimes more than one right answer in applied mathematics. Mathematics is the economy of information. The central idea of all mathematics is to discover how knowing some things well, via reasoning, permit students to know much else—without having to commit the information to memory as a separate fact. It is the connections, the reasoned, logical connections that make mathematics manageable. As a result, implementation of Georgia's Performance Standards places a greater emphasis on problem solving, reasoning, representation, connections, and communication.

### **Georgia Mathematics Performance Standards Grade 6**

By the end of grade six, students will understand the four arithmetic operations as they relate to positive rational numbers; convert between and compute with different forms of rational numbers; understand the concept of ratio and solve problems using proportional reasoning; understand and use line and rotational symmetry; determine the surface area and volume of solid figures; use variables to represent unknown quantities in formulae, algebraic expressions and equations; utilize data to make predictions; and determine the probability of a given event.

Instruction and assessment should include the use of manipulatives and appropriate technology. Topics should be represented in multiple ways including concrete/pictorial, verbal/written, numeric/data-based, graphical, and symbolic. Concepts should be introduced and used in the context of real world phenomena.

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#### **Concepts/Skills to Maintain**

Operations with decimal fractions  
Addition and subtraction of common fractions and mixed numbers with unlike denominators such as 2, 3, 4, 5, 6, 8, 10 and 12.  
Modeling multiplication of common fractions  
Modeling percent  
Graphing data  
Multiples and factors  
Perimeter, capacity and area of geometric figures  
Evaluating algebraic expressions

#### **NUMBER AND OPERATIONS**

Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will apply these concepts and associated skills in real world situations.

**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.
- b. Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic).
- c. Determine the greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers.
- d. Add and subtract fractions and mixed numbers with unlike denominators.
- e. Multiply and divide fractions and mixed numbers.
- f. Use fractions, decimals, and percents interchangeably.
- g. Solve problems involving fractions, decimals, and percents.

#### **MEASUREMENT**

Students will understand how to determine the volume and surface area of solid figures. They will understand and use the customary and metric systems of measurement to measure quantities efficiently and to represent volume and surface area appropriately.

**M6M1. Students will convert from one unit to another within one system of measurement (customary or metric) by using proportional relationships.**

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**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.
- c. Compare and contrast units of measure for perimeter, area, and 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.
- b. Compute the volumes of fundamental solid figures, using appropriate units of measure.
- c. Estimate the volumes of simple geometric solids.
- d. Solve application problems involving the volume of fundamental solid figures.

**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.
- b. Compute the surface area of right rectangular prisms and cylinders using formulae.
- c. Estimate the surface areas of simple geometric solids.
- d. Solve application problems involving surface area of right rectangular prisms and cylinders.

### **GEOMETRY**

Students will further develop their understanding of plane and solid geometric figures, incorporating the use of appropriate technology and using this knowledge to solve authentic problems.

**M6G1. Students will further develop their understanding of plane figures.**

- a. Determine and use lines of symmetry.
- b. Investigate rotational symmetry, including degree of rotation.
- c. Use the concepts of ratio, proportion and scale factor to demonstrate the relationships between similar plane figures.
- d. Interpret and sketch simple scale drawings.
- e. Solve problems involving scale drawings.

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#### **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.
- c. Interpret and sketch front, back, top, bottom and side views of solid figures.
- d. Construct nets for prisms, cylinders, pyramids, and cones.

### **ALGEBRA**

Students will investigate relationships between two quantities. They will write and solve proportions and simple one-step equations that result from problem situations.

#### **M6A1. Students will understand the concept of ratio and use it to represent quantitative relationships.**

#### **M6A2. Students will consider relationships between varying quantities.**

- a. Analyze and describe patterns arising from mathematical rules, tables, and graphs.
- b. Use manipulatives or draw pictures to solve problems involving proportional relationships.
- c. Use proportions ( $a/b=c/d$ ) to describe relationships and solve problems, including percent problems.
- d. Describe proportional relationships mathematically using  $y = kx$ , where  $k$  is the constant of proportionality.
- e. Graph proportional relationships in the form  $y = kx$  and describe characteristics of the graphs.
- 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  $y = kx$ .
- g. Use proportional reasoning ( $a/b=c/d$  and  $y = kx$ ) to solve problems.

#### **M6A3. Students will evaluate algebraic expressions, including those with exponents, and solve simple one-step equations using each of the four basic operations.**

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#### **DATA ANALYSIS AND PROBABILITY**

Students will demonstrate understanding of data analysis by posing questions to be answered by collecting data. They will represent, investigate, and use data to answer those questions. Students will understand experimental and theoretical 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.
- b. Using data, construct frequency distributions, frequency tables, and 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.
- d. Use tables and graphs to examine variation that occurs within a group and variation that occurs between groups.
- e. Relate the data analysis to the context of the questions posed.

#### **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.
- b. Determine, and use a ratio to represent, the theoretical probability of a given event.
- c. Discover that experimental probability approaches theoretical probability when the number of trials is large.

#### **Terms/Symbols:**

positive rational numbers, factors, multiples, decompose, prime numbers, prime factorization, Fundamental Theorem of Arithmetic, GCF, LCM, evaluate, surface area, metric system of measurement, customary system of measurement, proportional relationships, right rectangular prism, cylinder, pyramid, cone, geometric solid, net, geometric figures, line symmetry, rotational symmetry, similar plane figures, scale factor, scale drawings, relations, varying quantities, ratio, direct proportion, proportions, proportional reasoning, frequency distributions, pictographs, histograms, bar graphs, line graphs, circle graphs, line plot, frequency table, experimental probability, theoretical probability, sampling, event, random sample, population, non-routine word problems.

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### **Grade 6**

#### **Process Standards**

Each topic studied in this course should be developed with careful thought toward helping every student achieve the following process standards.

##### **M6P1. Students will solve problems (using appropriate technology).**

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

##### **M6P2. Students will reason and evaluate mathematical arguments.**

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

##### **M6P3. Students will communicate mathematically.**

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

##### **M6P4. Students will make connections among mathematical ideas and to other disciplines.**

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

##### **M6P5. Students will represent mathematics in multiple ways.**

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

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### **Reading Standard Comment**

After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context*.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

### **MRC. Students will enhance reading in all curriculum areas by:**

- a. Reading in All Curriculum Areas
  - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas
  - Read both informational and fictional texts in a variety of genres and modes of discourse
  - Read technical texts related to various subject areas
- b. Discussing books
  - Discuss messages and themes from books in all subject areas.
  - Respond to a variety of texts in multiple modes of discourse.
  - Relate messages and themes from one subject area to messages and themes in another area.
  - Evaluate the merit of texts in every subject discipline.

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- Examine author's purpose in writing.
- Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
  - Demonstrate an understanding of contextual vocabulary in various subjects.
  - Use content vocabulary in writing and speaking.
  - Explore understanding of new words found in subject area texts.
- d. Establishing context
  - Explore life experiences related to subject area content.
  - Discuss in both writing and speaking how certain words are subject area related.
  - Determine strategies for finding content and contextual meaning for unknown words.

## **6-8 Mathematics Georgia Performance Standards Grade 7**

By the end of grade seven, students will understand and use rational numbers, including signed numbers; solve linear equations in one variable; sketch and construct plane figures; demonstrate understanding of transformations; use and apply properties of similarity; examine properties of geometric shapes in space; describe and sketch solid figures, including their cross-sections; represent and describe relationships between variables in tables, graphs, and formulas; analyze the characteristics of linear relationships; and represent and analyze data using graphical displays, measures of central tendency, and measures of variation.

Instruction and assessment should include the appropriate use of manipulatives and technology. Topics should be represented in multiple ways, such as concrete/pictorial, verbal/written, numeric/data-based, graphical, and symbolic. Concepts should be introduced and used, where appropriate, in the context of realistic phenomena.

### **Concepts/Skills to Maintain**

Operations with positive rational numbers, including mixed numbers

Line and rotational symmetry

Surface area and volume

Ratio as a representation of quantitative relationships

### **NUMBER AND OPERATIONS**

Students will further develop their understanding of the concept of rational numbers and apply them to real world situations.

#### **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.
- b. Compare and order rational numbers, including repeating decimals.
- c. Add, subtract, multiply, and divide positive and negative rational numbers.
- d. Solve problems using rational numbers.

### **GEOMETRY**

Students will further develop and apply their understanding of plane and solid geometric figures through the use of constructions and transformations. Students will explore the properties of similarity and further develop their understanding of 3-dimensional figures.

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### **Grade 7**

#### **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.
- b. Recognize that many constructions are based on the creation of congruent triangles.

#### **M7G2. Students will demonstrate understanding of transformations.**

- a. Demonstrate understanding of translations, dilations, rotations, reflections, and relate symmetry to appropriate transformations.
- b. Given a figure in the coordinate plane, determine the coordinates resulting from a translation, dilation, rotation, or reflection.

#### **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.
- 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.
- c. Understand congruence of geometric figures as a special case of similarity: The figures have the same size and shape.

#### **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.

### **ALGEBRA**

Students will demonstrate an understanding of linear relations and fundamental algebraic concepts.

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### **M7A1. Students will represent and evaluate quantities using algebraic expressions.**

- Translate verbal phrases to algebraic expressions.
- Simplify and evaluate algebraic expressions, using commutative, associative, and distributive properties as appropriate.
- Add and subtract linear expressions.

### **M7A2. Students will understand and apply linear equations in one variable.**

- Given a problem, define a variable, write an equation, solve the equation, and interpret the solution.
- Use the addition and multiplication properties of equality to solve one- and two-step linear equations.

### **M7A3. Students will understand relationships between two variables.**

- Plot points on a coordinate plane.
- Represent, describe, and analyze relations from tables, graphs, and formulas.
- Describe how change in one variable affects the other variable.
- Describe patterns in the graphs of proportional relationships, both direct ( $y = kx$ ) and inverse ( $y = k/x$ ).

## **DATA ANALYSIS AND PROBABILITY**

Students will demonstrate understanding of data analysis by posing questions, collecting data, analyzing the data using measures of central tendency and variation, and using the data to answer the questions posed. Students will understand the role of probability in sampling.

### **M7D1. Students will pose questions, collect data, represent and analyze the data, and interpret results.**

- Formulate questions and collect data from a census of at least 30 objects and from samples of varying sizes.
- Construct frequency distributions.
- Analyze data using measures of central tendency (mean, median, and mode), including recognition of outliers.
- Analyze data with respect to measures of variation (range, quartiles, interquartile range).

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- 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.
- g. Analyze and draw conclusions about data, including describing the relationship between two variables.

### **Terms/Symbols:**

natural number, whole number, sign, integer, opposite, negative, positive, absolute value, term, variable, commutative property, associative property, distributive property, algebraic expression, linear equation, direct and indirect proportions, constant of proportionality ( $y = kx$ ), variation, polyhedron, translation, rotation, reflection, dilation, symmetry, bisector, parallel lines, perpendicular lines, cross-section, similar, congruent, point, line, plane, line segment, endpoints, intersection, ray, parallel lines, perpendicular lines, similar, similarity, rate, scale drawings, corresponding sides, corresponding angles, congruent, diagonal, algebraic expression, commutative property, associative property, distributive property, direct variation, inverse variation, inversely proportional, mean, median, mode, range, quartile, interquartile range, outlier, histogram, scatter plot, line plot, box-and-whisker plot,  $\cong$ ,  $\sim$ ,  $\approx$ ,  $\parallel$ ,  $\perp$ ,  $\angle$ .

### **Process Standards**

The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.

#### **M7P1. Students will solve problems (using appropriate technology).**

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

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### **M7P2. Students will reason and evaluate mathematical arguments.**

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

### **M7P3. Students will communicate mathematically.**

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

### **M7P4. Students will make connections among mathematical ideas and to other disciplines.**

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

### **M7P5. Students will represent mathematics in multiple ways.**

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

#### **Reading Standard Comment**

After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context*.

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### **Grade 7**

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

#### **MRC. Students will enhance reading in all curriculum areas by:**

- a. Reading in all curriculum areas
  - Read a minimum of 25 grade-level appropriate books per year from a variety of subjects.
  - disciplines and participate in discussions related to curricular learning in all areas.
  - Read both informational and fictional texts in a variety of genres and modes of discourse.
  - Read technical texts related to various subject areas
- b. Discussing books
  - Discuss messages and themes from books in all subject areas.
  - Respond to a variety of texts in multiple modes of discourse.
  - Relate messages and themes from one subject area to messages and themes in another area.
  - Evaluate the merit of texts in every subject discipline.
  - Examine author's purpose in writing.
  - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
  - Demonstrate an understanding of contextual vocabulary in various subjects.
  - Use content vocabulary in writing and speaking.
  - Explore understanding of new words found in subject area texts.
- d. Establishing context
  - Explore life experiences related to subject area content.
  - Discuss in both writing and speaking how certain words are subject area related.
  - Determine strategies for finding content and contextual meaning for unknown words.

## **6-8 Mathematics Georgia Performance Standards Grade 8**

By the end of grade eight, students will understand various numerical representations, including square roots, exponents and scientific notation; use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem; use symbolic algebra to represent situations and solve problems, especially those that involve linear relationships; solve linear equations, systems of linear equations and inequalities; use equations, tables and graphs to analyze and interpret linear functions; use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from statistical data, particularly data that can be modeled by linear functions.

Instruction and assessment should include the appropriate use of manipulatives and technology. Topics should be represented in multiple ways, such as concrete/pictorial, verbal/written, numeric/data-based, graphical, and symbolic. Concepts should be introduced and used, where appropriate, in the context of realistic phenomena.

**Concepts/Skills to Maintain**  
Operations with rational numbers  
Properties of equalities  
Direct & inverse proportions  
Solving multi-step equations  
Properties of real numbers  
Statistics

### **NUMBER AND OPERATIONS**

Students will understand the numeric and geometric meaning of square root, apply properties of integer exponents and use scientific notation.

#### **M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.**

- a. Find square roots of perfect squares.
- b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.
- c. Recognize square roots as points and as lengths on a number line.
- d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.
- e. Recognize and use the radical symbol to denote the positive square root of a positive number.

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- f. Estimate square roots of positive numbers.
- g. Simplify, add, subtract, multiply, and divide expressions containing square roots.
- h. Distinguish between rational and irrational numbers.
- i. Simplify expressions containing integer exponents.
- j. Express and use numbers in scientific notation.
- k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

### **GEOMETRY**

Students will use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem.

#### **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.
- b. Apply properties of angle pairs formed by parallel lines cut by a transversal.
- 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.

#### **M8G2. Students will understand and use the Pythagorean theorem.**

- a. Apply properties of right triangles, including the Pythagorean theorem.
- b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.

### **ALGEBRA**

Students will use linear algebra to represent, analyze and solve problems. They will use equations, tables, and graphs to investigate linear relations and functions, paying particular attention to slope as a rate of change.

#### **M8A1. Students will use algebra to represent, analyze, and solve problems.**

- a. Represent a given situation using algebraic expressions or equations in one variable.
- b. Simplify and evaluate algebraic expressions.

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- c. Solve algebraic equations in one variable, including equations involving absolute values.
- d. Solve equations involving several variables for one variable in terms of the others.
- e. Interpret solutions in problem contexts.

### **M8A2. Students will understand and graph inequalities in one variable.**

- a. Represent a given situation using an inequality in one variable.
- b. Use the properties of inequality to solve inequalities.
- c. Graph the solution of an inequality on a number line.
- d. Interpret solutions in problem contexts.

### **M8A3. Students will understand relations and linear functions.**

- a. Recognize a relation as a correspondence between varying quantities.
- b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.
- c. Distinguish between relations that are functions and those that are not functions.
- d. Recognize functions in a variety of representations and a variety of contexts.
- e. Use tables to describe sequences recursively and with a formula in closed form.
- f. Understand and recognize arithmetic sequences as linear functions with whole number input values.
- 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.
- i. Translate among verbal, tabular, graphic, and algebraic representations of functions.

### **M8A4. Students will graph and analyze graphs of linear equations and inequalities.**

- a. Interpret slope as a rate of change.
- b. Determine the meaning of the slope and y-intercept in a given situation.
- c. Graph equations of the form  $y = mx + b$ .
- 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.
- f. Determine the equation of a line given a graph, numerical information that defines the line or a context involving a linear relationship.
- g. Solve problems involving linear relationships.

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### **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.
- c. Graph the solution set of a system of linear inequalities in two variables.
- d. Interpret solutions in problem contexts.

### **DATA ANALYSIS AND PROBABILITY**

Students will use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from data, particularly data that can be modeled by linear functions.

### **M8D1. Students will apply basic concepts of set theory.**

- a. Demonstrate relationships among sets through use of Venn diagrams.
- b. Determine subsets, complements, intersection, and union of sets.
- 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.
- b. Apply the addition and multiplication principles of counting.

### **M8D3. Students will use the basic laws of probability.**

- a. Find the probability of simple independent events.
- b. Find the probability of compound independent events.

### **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.

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### **Terms/Symbols:**

square root, radical,  $\sqrt{\quad}$ , rational, irrational, exponent, additive inverse, multiplicative inverse, scientific notation, significant digits, inequality, sequence, arithmetic sequence, recursive, linear function, function, relation, rate of change, slope, intercept, linear equation, linear inequality, like terms, system of linear equations, transversal, vertical angles, complementary angles, supplementary angles, alternate interior angles, alternate exterior angles, corresponding angles, Pythagorean theorem, legs, hypotenuse, set,  $\{ \}$ , element,  $\in$ , subset,  $\subset$ , complement of a set, intersection,  $\cap$ , union,  $\cup$ , Venn diagram, tree diagram, multiplication principle, addition principle, line of best fit

### **Process Standards**

The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.

#### **M8P1. Students will solve problems (using appropriate technology).**

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

#### **M8P2. Students will reason and evaluate mathematical arguments.**

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

#### **M8P3. Students will communicate mathematically.**

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

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### **M8P4. Students will make connections among mathematical ideas and to other disciplines.**

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

### **M8P5. Students will represent mathematics in multiple ways.**

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

#### **Reading Standard Comment**

After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context*.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

## *6-8 Mathematics Georgia Performance Standards* **Grade 8**

### **MRC. Students will enhance reading in all curriculum areas by:**

- a. Reading in all curriculum areas
  - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas
  - Read both informational and fictional texts in a variety of genres and modes of discourse
  - Read technical texts related to various subject areas
- b. Discussing books
  - Discuss messages and themes from books in all subject areas.
  - Respond to a variety of texts in multiple modes of discourse.
  - Relate messages and themes from one subject area to messages and themes in another area.
  - Evaluate the merit of texts in every subject discipline.
  - Examine author's purpose in writing.
  - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
  - Demonstrate an understanding of contextual vocabulary in various subjects.
  - Use content vocabulary in writing and speaking.
  - Explore understanding of new words found in subject area texts.
- d. Establishing context.
  - Explore life experiences related to subject area content.
  - Discuss in both writing and speaking how certain words are subject area related.
  - Determine strategies for finding content and contextual meaning for unknown words.