Acc. Algebra I/Geometry A

COBB TEACHING AND LEARNING STANDARDS

Accelerated Algebra I/Geometry A Teaching & Learning Framework

Semester 1					Semester 2			
Unit 1￼2 weeks	Unit 2￼3 weeks	Unit 3￼5 weeks	Unit 4￼4 weeks	Unit 5￼4 weeks	Unit 6￼3 weeks	Unit 7￼2 weeks	Unit 8￼9 weeks	Unit 9￼4 weeks
Relationships Between Quantities & Expressions	Reasoning with Linear Equations & Inequalities	Modeling & Analyzing Quadratic Functions	Modeling & Analyzing Exponential Functions	Comparing & Contrasting Functions	Describing Data	Transformations in the Coordinate Plane	Similarity, Congruence & Proofs	Right Triangle Trigonometry Review & Extend
MGSE9-12.N.RN.2-3 (Properties of rational & irrational numbers) **MGSE9-12.N.Q.1-3** (Reason quantitatively & use units to solve problems) **MGSE9-12.A.SSE.1** (Interpret expressions in context) **MGSE9-12.A.SSE.1a-b** (Interpret formulas & expressions in context) **MGSE9-12.A.APR.1** (Add, subtract & multiply polynomials)	**MGSE9-12.A.CED.1-4** (Create equations that describe numbers or relationships) **MGSE9-12.A.REI.1,3,5** (Solve equations & inequalities 1-2 variable) **MGSE9-12.A.REI.6** (Solve systems) **MGSE9-12.A.REI.10-12** (Solve equations & inequalities 2 variables) **MGSE9-12.F.BF.1** (Write a function) **MGSE9-12.F.BF.1a,2** (Arithmetic & geometric sequences) **MGSE9-12.F.IF.1** (Input vs. output) **MGSE9-12.F.IF.2** (Function notation) **MGSE9-12.F.IF.3-4** (Sequences & characteristics) **MGSE9-12.F.IF.5-6** (Rate of change) **MGSE9-12.F.IF.7,7a,9** (Analyze functions)	**MGSE9-12.A.SSE.2** (Interpret the structure of expressions) **MGSE9-12.A.SSE.3,3a-b** (Equivalent forms of expressions) **MGSE9-12.A.CED.1-2,4** (Create equations that describe numbers or relationships) **MGSE9-12.A.REI.1** (Justify how to solve an equation) **MGSE9-12.A.REI.4,4a-b** (Methods of solving quadratics) **MGSE9-12.F.BF.1,3** (Write a function & build new functions) **MGSE9-12.F.IF.1** (Input vs. output) **MGSE9-12.F.IF.2** (Function notation) **MGSE9-12.F.IF.4** (Characteristics) **MGSE9-12.F.IF.5-6** (Rate of change) **MGSE9-12.F.IF.7,7a** (Graph functions) **MGSE9-12.F.IF.8** (Write a function) **MGSE9-12.F.IF.8a,9** (Compare & contrast functions)	**MGSE9-12.A.CED.1-2** (Create equations 1-2 variables) **MGSE9-12.A.REI.1** (Justify how to solve an equation) **MGSE9-12.F.BF.1** (Write a function) **MGSE9-12.F.BF.1a,2** (Arithmetic & geometric sequences) **MGSE9-12.F.BF.3** (Build new functions) **MGSE9-12.F.IF.1** (Input vs. output) **MGSE9-12.F.IF.2** (Function notation) **MGSE9-12.F.IF.3-4** (Sequences & characteristics) **MGSE912.F.IF.5-6** (Rate of change) **MGSE9-12.F.IF.7,7e** (Graph functions) **MGSE9-12.F.IF.9** (Compare functions)	**MGSE9-12.F.LE.1** (Linear vs exponential) **MGSE9-12.F.LE.1a** (Growth of functions) **MGSE9-12.F.LE.1b,c,2-3** (Changes in rate and relating to context) **MGSE9-12.F.LE.5** (Interpret parameters) **MGSE9-12.F.BF.3** (Build new functions) **MGSE9-12.F.IF.1** (Input vs. output) **MGSE9-12.F.IF.2** (Function notation) **MGSE9-12.F.IF.4** (Characteristics) **MGSE9-12.F.IF.5-6** (Rate of change) **MGSE9-12.F.IF.7** (Graph functions) **MGSE9-12.F.IF.9** (Compare functions)	**MGSE9-12.S.ID.1** (Dot plots, histograms & box plots) **MGSE9-12.S.ID.2** (Compare data distribution) **MGSE9-12.S.ID.3** (Shape, center & spread) **MGSE9-12.S.ID.5-6** (Bivariate data) **MGSE9-12.S.ID.6a,c** (Function of best fit) **MGSE9-12.S.ID.7-9** (Slope, correlation coefficient, causation & correlation)	**MGSE9-12.G.CO.1** (Precise definitions) **MGSE9-12.G.CO.2** (Coordinate plane) **MGSE9-12.G.CO.3** (Figures with rotations & reflections upon itself) **MGSE9-12.G.CO.4** (Definitions of transformations) **MGSE9-12.G.CO.5** (Transforming figures)	**MGSE9-12.G.SRT.1-2** (Dilations & similarity) **MGSE9-12.G.SRT.3** (AA criterion) **MGSE9-12.G.SRT.4** (Prove theorems about triangles) **MGSE9-12.G.SRT.5** (Congruence & similarity) **MGSE9-12.G.CO.6-7** (Congruence & rigid motions) **MGSE9-12.G.CO.8** (Triangle congruence) **MGSE9-12.G.CO.9-11** (Prove geometric theorems) **MGSE9-12.G.CO.12** (Geometric constructions) **MGSE9-12.G.CO.13** (Construct regular polygons inscribed in a circle)	**MGSE9-12.G.SRT.6** (Trigonometric ratios) **MGSE9-12.G.SRT.7** (Sine & cosine of complementary angles) **MGSE9-12.G.SRT.8** (Trigonometric ratios & Pythagorean Theorem)￼**Review:** All standards by differentiating for student needs￼**Extend:** **MGSE9-12.G.C.1-2** (Similar circles; radii, chords, tangents & secants with inscribed angles)

These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units.
All units will include the Mathematical Practices and indicate skills to maintain

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics. **Revised standards are in red font.**
Grades 9-12 Key: Algebra Strand: SSE = Seeing Structure in Expressions, APR = Arithmetic with Polynomial and Rational Expressions, CED = Creating Equations, REI = Reasoning with Equations and Inequalities
Functions Strand: IF = Interpreting Functions, LE = Linear and Exponential Models, BF = Building Functions, TF = Trigonometric Functions
Geometry Strand: CO = Congruence, SRT = Similarity, Right Triangles, and Trigonometry, C = Circles, GPE = Expressing Geometric Properties with Equations, GMD = Geometric Measurement and Dimension, MG = Modeling with Geometry
Statistics and Probability Strand: ID = Interpreting Categorical and Quantitative Data, IC = Making Inferences and Justifying Conclusions, CP = Conditional Probability and the Rules of Probability, MD = Using Probability to Make Decisions

Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

1. Make sense of problems and persevere in solving them.
High school students start to examine problems by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. By high school, students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. They check their answers to problems using different methods and continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. Reason abstractly and quantitatively.
High school students seek to make sense of quantities and their relationships in problem situations. They abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Students use quantitative reasoning to create coherent representations of the problem at hand; consider the units involved; attend to the meaning of quantities, not just how to compute them; and know and flexibly use different properties of operations and objects.

3. Construct viable arguments and critique the reasoning of others.
High school students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. High school students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. High school students learn to determine domains to which an argument applies, listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Standards for Mathematical Practice continued

4. Model with mathematics.
High school students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. High school students making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. Use appropriate tools strategically.
High school students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. High school students should be sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. They are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. Attend to precision.
High school students try to communicate precisely to others by using clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Standards for Mathematical Practice continued

7. Look for and make use of structure. By high school, students look closely to discern a pattern or structure. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.

8. Look for and express regularity in repeated reasoning.
High school students notice if calculations are repeated, and look both for general methods and for shortcuts. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, derive formulas or make generalizations, high school students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

The Real Number System (N.RN)

Extend the properties of exponents to rational exponents.

MGSE9-12.N.RN.2 Rewrite expressions involving radicals (i.e., simplify and/or use the operations of addition, subtraction, and multiplication, with radicals within expressions limited to square roots).

Use properties of rational and irrational numbers.

MGSE9-12.N.RN.3 Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.

Quantities (N.Q.)

Reason quantitatively and use units to solve problems.

MGSE9-12.N.Q.1 Use units of measure (linear, area, capacity, rates, and time) as a way to understand problems:
    a. Identify, use, and record appropriate units of measure within context, within data displays, and on graphs;
    b. Convert units and rates using dimensional analysis (English-to-English and Metric-to-Metric without conversion factor provided and between English and Metric with conversion factor);
    c. Use units within multi-step problems and formulas; interpret units of input and resulting units of output.

MGSE9-12.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. Given a situation, context, or problem, students will determine, identify, and use appropriate quantities for representing the situation.

MGSE9-12.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *For example, money situations are generally reported to the nearest cent (hundredth). Also, an answers' precision is limited to the precision of the data given*.

Seeing Structure in Expressions (A.SSE)

Interpret the structure of expressions

MGSE9-12.A.SSE.1 Interpret expressions that represent a quantity in terms of its context.

    a. Interpret parts of an expression, such as terms, factors, and coefficients, in context.

    b. Given situations which utilize formulas or expressions with multiple terms and/or factors, interpret the meaning (in context) of individual terms or factors.

MGSE9-12.A.SSE.2 Use the structure of an expression to rewrite it in different equivalent forms. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

Write expressions in equivalent forms to solve problems

MGSE9-12.A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

    a. Factor any quadratic expression to reveal the zeros of the function defined by the expression.

    b. Complete the square in a quadratic expression to reveal the maximum and minimum value of the function defined by the expression.

Arithmetic with Polynomials and Rational Expression (A.APR)

Perform arithmetic operations on polynomials

MGSE9-12.A.APR.1 Add, subtract, and multiply polynomials; understand that polynomials form a system analogous to the integers in that they are closed under these operations.

Reasoning with Equations and Inequalities (A.REI)

Understand solving equations as a process of reasoning and explain the reasoning

MGSE9-12.A.REI.1 Using algebraic properties and the properties of real numbers, justify the steps of a simple, one-solution equation. Students should justify their own steps, or if given two or more steps of an equation, explain the progression from one step to the next using properties.

Solve equations and inequalities in one variable

MGSE9-12.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. *For example, given ax + 3 = 7, solve for x.*

MGSE9-12.A.REI.4 Solve quadratic equations in one variable.

   a.   Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from $ax^2 + bx + c = 0$.

   b.   Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, factoring, completing the square, and the quadratic formula, as appropriate to the initial form of the equation (limit to real number solutions).

Solve systems of equations

MGSE9-12.A.REI.5 Show and explain why the elimination method works to solve a system of two-variable equations.

MGSE9-12.A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Represent and solve equations and inequalities graphically

MGSE9-12.A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane**.**

Represent and solve equations and inequalities graphically (continued)

MGSE9-12.A.REI.11 Using graphs, tables, or successive approximations, show that the solution to the equation f(x) = g(x) is the x-value where the y-values of f(x) and g(x) are the same.

MGSE9-12.A.REI.12 Graph the solution set to a linear inequality in two variables.

Interpreting Functions (F.IF)

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 Understand that a function from one set (the input, called the domain) to another set (the output, called the range) assigns to each element of the domain exactly one element of the range, i.e. each input value maps to exactly one output value. If f is a function, and x is the input (an element of the domain), then $f(x)$ is the output (an element of the range). Graphically, the graph is $y = f(x)$.

MGSE9-12.F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

MGSE9-12.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. (Generally, the scope of high school math defines this subset as the set of natural numbers 1, 2, 3, 4, …) By graphing or calculating terms, students should be able to show how the recursive sequence $a_1 = 7$, $a_n = a_{n-1} + 2$; the sequence $s_n = 2(n-1) + 7$; and the function $f(x) = 2x + 5$ (when x is a natural number) all define the same sequence.

Interpret functions that arise in applications in terms of the context

MGSE9-12.F.IF.4 Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior.

MGSE9-12.F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

MGSE9-12.F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Analyze functions using different representations

MGSE9-12.F.IF.7 Graph functions expressed algebraically and show key features of the graph both by hand and by using technology.

    a. Graph linear and quadratic functions and show intercepts, maxima, and minima (as determined by the function or by context).

    e. Graph exponential functions, showing intercepts and end behavior.

MGSE9-12.F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

    a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. *For example, compare and contrast quadratic functions in standard, vertex, and intercept forms.*

MGSE9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one function and an algebraic expression for another, say which has the larger maximum.*

Building Functions (F.BF)

Build a function that models a relationship between two quantities

MGSE9-12.F.BF.1 Write a function that describes a relationship between two quantities.

    a. Determine an explicit expression and the recursive process (steps for calculation) from context. *For example, if Jimmy starts out with $15 and earns $2 a day, the explicit expression "2x+15" can be described recursively (either in writing or verbally) as "to find out how much money Jimmy will have tomorrow, you add $2 to his total today."* $J_n = J_{n-1} + 2, J_0 = 15$

MGSE9-12.F.BF.2 Write arithmetic and geometric sequences both recursively and explicitly, use them to model situations, and translate between the two forms. Connect arithmetic sequences to linear functions and geometric sequences to exponential functions.

Build new functions from existing functions

MGSE9-12.F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Linear, Quadratic, and Exponential Models (F.LE)

Construct and compare linear, quadratic, and exponential models and solve problems

MGSE9-12.F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.

a. Show that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. (This can be shown by algebraic proof, with a table showing differences, or by calculating average rates of change over equal intervals).

b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

MGSE9-12.F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

MGSE9-12.F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

Interpret expressions for functions in terms of the situation they model

MGSE9-12.F.LE.5 Interpret the parameters in a linear ($f(x) = mx + b$) and exponential
($f(x) = a \cdot d^x$) function in terms of a context. (In the functions above, "m" and "b" are the parameters of the linear function, and "a" and "d" are the parameters of the exponential function.) In context, students should describe what these parameters mean in terms of change and starting value.

Congruence (G.CO)

Experiment with transformations in the plane

MGSE9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

MGSE9-12.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

MGSE9-12.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

MGSE9-12.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

MGSE9-12.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another

Understand congruence in terms of rigid motions

MGSE9-12.G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

MGSE9-12.G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

MGSE9-12.G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. (Extend to include HL and AAS.)

Prove geometric theorems

MGSE9-12.G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

MGSE9-12.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

MGSE9-12.G.CO.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

Make geometric constructions

MGSE9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). 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.

MGSE9-12.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon, each inscribed in a circle.

Similarity, Right Triangles, and Trigonometry (G.SRT)

Understand similarity in terms of similarity transformations

MGSE9-12.G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor.

   a. The dilation of a line not passing through the center of the dilation results in a parallel line and leaves a line passing through the center unchanged.
   b. The dilation of a line segment is longer or shorter according to the ratio given by the scale factor.

Understand similarity in terms of similarity transformations (continued)

MGSE9-12.G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain, using similarity transformations, the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

MGSE9-12.G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Prove theorems involving similarity

MGSE9-12.G.SRT.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, (and its converse); the Pythagorean Theorem using triangle similarity.

MGSE9-12.G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Define trigonometric ratios and solve problems involving right triangles

MGSE9-12.G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

MGSE9-12.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.

MGSE9-12.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Interpreting Categorical and Quantitative Data (S.ID)

Summarize, represent, and interpret data on a single count or measurement variable

MGSE9-12.S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

MGSE9-12.S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, mean absolute deviation, of two or more different data sets.

MGSE9-12.S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Summarize, represent, and interpret data on two categorical and quantitative variables

MGSE9-12.S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

MGSE9-12.S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

   a. Decide which type of function is most appropriate by observing graphed data, charted data, or by analysis of context to generate a viable (rough) function of best fit. Use this function to solve problems in context. Emphasize linear, quadratic and exponential models.

   c. Using given or collected bivariate data, fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models

MGSE9-12.S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

MGSE9-12.S.ID.8 Compute (using technology) and interpret the correlation coefficient "r" of a linear fit. (For instance, by looking at a scatterplot, students should be able to tell if the correlation coefficient is positive or negative and give a reasonable estimate of the "r" value.) After calculating the line of best fit using technology, students should be able to describe how strong the goodness of fit of the regression is, using "r".

MGSE9-12.S.ID.9 Distinguish between correlation and causation.