Pre-AP Algebra I Grade 8
4th Nine Weeks Scope and Sequence

Content Standards	Dates Taught	% of Students scoring over 70%	Dates Re-taught (Optional)	Formative and Summative Assessments/ (Any Additional Comments Optional)
Algebra (Algebra I Course of Study)				
18. Solve quadratic equations in one variable. [A-REI4] b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square and the quadratic formula, and factoring as appropriate to the initial form of the equation. [A-REI4b] (**Alabama**)				
Geometry				
21. Explain a proof of the Pythagorean Theorem and its converse. [8-G6]				
23. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. [8-G8]				
22. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. [8-G7]				
Number and Quantity (Algebra I Course of Study)				
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. [N-RN2]				
1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. [N-RN1] Example: We define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.				

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Algebra (Algebra I Course of Study)				
10. Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1]				
9. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* [A-SSE3] c. Determine a quadratic equation when given its graph or roots. (**Alabama**)				
13. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales (***Quadratic*).** [A-CED2]				
Functions (Algebra I Course of Study)				
28. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity (**Quadratics**).** [F-IF4]				
36. 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. [F-BF3]				

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30. 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.* [F-IF6]				
31. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7] a. Graph linear and quadratic functions, and show intercepts, maxima, and minima. [F-IF7a]				
Algebra (Algebra I Course of Study)				
8. Use the structure of an expression to identify ways to rewrite it. [A-SSE2] 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 $(x^2 - y^2)(x^2 + y^2)$.				
9. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* [A-SSE3] a. Factor a quadratic expression to reveal the zeros of the function it defines. [A-SSE3a]				
18.) Solve quadratic equations in one variable. [A-REI4] 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 this form. [A-REI4a]				
Number and Quantity (Algebra I Course of Study)				
3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. [N-RN3]				

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Functions (Algebra I Course of Study)				
32. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8] 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. [F-IF8a] b.				
Algebra (Algebra I Course of Study)				
9. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* [A-SSE3] b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. [A-SSE3b]				
7. Interpret expressions that represent a quantity in terms of its context.* [A-SSE1] a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a] b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b] **Example:** Interpret $P(1+r)^n$ as the product of P and a factor not depending on P.				
12. Create equations and inequalities in one variable, and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* [A-CED1]				

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Functions (Algebra I Course of Study)				
29. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5] **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.				
34. Write a function that describes a relationship between two quantities.* [F-BF1] a. Determine an explicit expression, a recursive process, or steps for calculation from a context. [F-BF1a] b. Combine standard function types using arithmetic operations. [F-BF1b] **Example:** Build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.				
Statistics and Probability (Algebra I Course of Study)				
45. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. [S-ID6] a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* [S-ID6a]				
Number and Quantity (Algebra I Course of Study)				
4. Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. [N-Q1]				

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Functions				
13. Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. [8-F3] **Example:** The function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4), and (3,9), which are not on a straight line.				
Algebra (Algebra I Course of Study)				
22. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [A-REI10]				
Functions (Algebra I Course of Study)				
29. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5] **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.				
31. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7] b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b]				
39. Observe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. [F-LE3]				

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Algebra (Algebra I Course of Study)				
21. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. [A-REI7] **Example:** Find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.				
Functions (Algebra I Course of Study)				
33. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9] **Example:** Given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.				