Algebra II
PISD Curriculum: Year at a Glance

Bundle	Big Ideas/Enduring Understandings	Guiding Questions
	Systems of Equations	
1	Functions can be represented by graphs, tables, and symbols.	1. What is a function? 2. What methods can be used to find the domain and range of functions? 3. What conclusions can be drawn from a function or equation? 4. How can models of a function be used to make predictions in a real world situation?
	No matter how you choose to solve a system of linear equations, your result will always be one of three solutions – no solution, infinitely many solutions, or one intersection point.	1. What are the three possible types of solutions to a system of equations? 2. How many different ways can you solve a system of equations? 3. How do you choose which method to use? 4. What do all the points in a feasible region represent? 5. What does the solution to a system represent in a real life situation? 6. Is the slope the ratio of vertical change to the horizontal change?-explain 7. How many different ways can the equation of a line be written?
	Matrices and Factoring	
2	No matter how you choose to solve a quadratic function for real solutions, you are always looking for where the function crosses the x-axis.	1. What does it mean if the parabola does not cross the x-axis? 2. How many ways can you solve a quadratic? 3. How many different terms are used to identify the solutions to a quadratic? 4. What portion of the parabola represents the maximum or minimum and why?
	Matrices are another tool to solve systems of equations and can be used to solve real world problems.	1. How can matrices be used to solve systems of equations?
	Quadratics	
3	No matter how you choose to solve a quadratic function for real solutions, you are always looking for where the function crosses the x-axis.	1. What does it mean if the parabola does not cross the x-axis? 2. How many ways can you solve a quadratic? 3. How many different terms are used to identify a solution to a quadratic?
	The graph of a quadratic function is a parabola. It forms a curve because the slope doesn't stay constant like in a linear function.	1. How does a quadratic function differ from a linear function? 2. What portion of the parabola represents the maximum or minimum and why? 3. What does the standard form of a quadratic function look like? 4. How can models of a quadratic function be used to make predictions in a real world situation? 5. What are some applications of quadratic functions and how can you tell if a quadratic can be used to model a situation?
	Quadratics (continued)	
4	No matter how you choose to solve a quadratic function for real solutions, you are always looking for where the function crosses the x-axis.	1. What does it mean if the parabola does not cross the x-axis? 2. How many ways can you solve a quadratic? 3. How many different terms are used to identify a solution to a quadratic?
	The graph of a quadratic function is a parabola. It forms a curve because the slope doesn't stay constant like in a linear function.	1. How does a quadratic function differ from a linear function? 2. What portion of the parabola represents the maximum or minimum and why? 3. What does the standard form of a quadratic function look like? 4. How can models of a quadratic function be used to make predictions in a real world situation? 5. What are some applications of quadratic functions and how can you tell if a quadratic can be used to model a situation?
	Exponents	
5	Properties of exponents can be used to solve equations, simplify roots and rationalize denominators	1. What do negative exponents mean? 2. What happens with the exponents when the same bases are multiplied or divided?
	Rational exponents provide a way to use the properties of exponents to simplify radical expressions which are otherwise hard to simplify.	1. What do rational exponents mean? 2. What does it mean to "rationalize" the denominator? 3. What is a conjugate and how can it be used to rationalize a denominator?
	Inverse Functions and Logs	
6	Inverse functions are "undoing" functions. A logarithmic function is the inverse of an exponential function, so a log "undoes" an exponent, just as subtraction undoes addition or division undoes multiplication.	1. How many ways can you determine if two functions are inverses of each other? 2. How can composition of functions help to determine if two functions are inverses? 3. Do inverse functions involve symmetry? 4. What is the relationship between logarithmic functions and exponential functions? 5. How are the properties of logarithms related to the properties of exponents? 6. How can you rewrite a logarithmic expression as an exponential expression and vise versa? 7. What is *e*, how is it different in comparison to base 10?
	Logarithms can be used to model real life situations such as measuring financial growth, intensity of earthquakes, and the scale to zoom in on Google Earth.	1. How can logarithmic functions help us to determine the intensity of an earthquake? 2. How can logarithmic functions and natural logs be used to find out when investments will double, triple? 3. What type of function can be used to measure the zoom used on Google Earth?

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7	***Exponential and Logarithmic Functions***	
	Real world applications involving growth can be modeled using a linear growth model or exponential growth models.	1. When data increases/decreases by a constant rate, can that data be modeled by an exponential growth/decay model? 2. What type of function can be used to model medicine leaving the body's blood stream? How can you determine how long it will take an amount of deposited money to double? Triple? Quadruple? 3. What is the average growth rate and proportional growth rate for a set of data? 4. Using each model, what do you predict will happen in the future, and which model is best for the particular situation- why? 5. How do parameter changes affect the graph of an exponential function? 6. How can the properties of exponents be used to simplify expressions?
8	***Quadratic and Square Root Functions***	
	Square root functions inverses of quadratic functions, so every quadratic problem can be rewritten as a square root problem.	1. How are quadratic functions and square root functions related? 2. How are they different? 3. How are they the same? (Include discussion of graphs, domain and range and related ordered pairs for each function.) 4. How would you describe the graph of a square root function using the vocabulary of quadratic functions?
	Domain and range restrictions limit the possible solutions of square root equations and application problems.	1. What makes the solution to a square root equation "reasonable"? 2. How do parameter changes affect the graph and zeros of the square root function?
9	***Rational Functions***	
	Rational expressions, equations and functions can be expressed as the products and quotients of polynomials.	1. What is a rational expression, equation or function?
	Factoring, exponent rules, and operations with fractions are all necessary tools for simplifying rational expressions, solving rational equations, and analyzing and interpreting rational functions.	1. How does factoring help while performing operations with rational expressions or solving rational equations? 2. How do you find the domain, range, x & y intercepts, roots, asymptotes and holes of a rational function?
	Rational functions can be used to solve inverse variation, mixture and rate real world problems.	1. What applications can you model with rational functions?
10	***Transformations of Parent Functions***	
	Parent functions provide a framework for describing and predicting the effects of parameter changes on equations of families of functions and their graphs.	1. What is a parameter and what are parameter changes? 2. What effect does changing the *h*, *k*, and *a* values in the standard form of the equation of a function have on the graph? 3. What effect does transforming a graph have on the on the *a*, *k*, and *h* values in the standard form of the equation of a function?
11	***TAKS review and intro to Conics***	
	The concepts of algebra II go beyond the concepts tested on the TAKS, but they also include many of the concepts tested on the TAKS test.	1. What algebra II TEKS and vocabulary are included in the TAKS objectives? 2. How are arithmetic, algebra I and geometry related to algebra II?
	Conic Sections are a slice of one or more cones.	1. How does changing the angle of the plane of intersection of a cone produce the different conic sections?
	Many natural phenomena can be described and explained using conic sections.	1. What properties of conic sections make them useful for describing the natural world?
	Conic sections share some characteristics with the quadratic functions.	1. How are parameter changes in conic sections equations related to parameter changes in parent functions? 2. Are conic sections always functions? 3. Can a conic section be written as a function or functions?
12	***Conic Sections***	
	Each conic section has its own important characteristics, they have similarities and differences, but they are all symmetrical.	1. What do focus (foci), center, vertex (vertices), axis(axes) of symmetry, directrix, and asymptotes mean in context of the different conic sections? 2. What is the difference between the major and minor axis of a hyperbola?
	The general form of the conic equation can be converted to the standard form and a conic section can be identified from the standard form of its equation.	1. How can the values of A and B in the general form of the conic section equation be used to identify the kind and orientation of the conic section? 2. How can we convert the general form of a conic into the standard form?