# Rockwall ISD Pre-Calculus Parent Guide

**Course Resources and Support**

**Online Textbook** Log into Google with student google account. RISD Secondary Online Learning Resources

**ALEKS McGraw Hill** Log into Google with student google account. RISD Secondary Online Learning Resources

**Texas Gateway Resources** Search by TEK #, e.g. P.2I and look for Study Edge resources Texas Gateway

**Kahn Academy SAT Practice** Sign up with College Board ID, Parent can sign up to coach Khan Academy SAT Practice

| Grading Period* | Unit Goals (TEKS) | Pre-Calculus Textbook McGraw Hill |
|---|---|---|
| 1 | **Unit 1: Graphs, Attributes and Applications of Functions**<br>Students will graph and analyze families of functions that will be used in Precalculus<br>**Student Learning Objectives**:<br>● I can graph and generate function rules of parent functions. (P.2F, SAT)<br>● **I can analyze key attributes of parent functions including:(Linear, Quadratic, Cubic, exponential, logarithmic, rational, polynomial, power and piecewise defined functions, including step functions. (P.2I, SAT)**<br>● I can explore even and odd functions and describe the symmetry of these functions using multiple representations. (P.2D)<br>● I can analyze and describe end behavior of functions in mathematical and real world problems using multiple representations, including infinity notation. (P.2J)<br>● I can determine various types of discontinuities, including jump, infinite and removable discontinuities and explore the limitations of the graphing calculator. (P.2L)<br>● **I can describe the left-sided behavior and the right-sided behavior of the graph of a function around discontinuities. (P.2M)**<br>● I can analyze situations modeled by functions to solve real-world problems. (P.2N)<br>● I can solve linear absolute value equations in one variable. (SAT) | **Chapter 1, Sections 1-5** |

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| | **Unit 2: Compositions and Inverses of Functions**<br>Students will be able to determine an inverse function, including any domain restrictions, and verify the inverse using compositions.<br>**Student Learning Objectives**:<br>● I can write 2 function rules that can be composed to model and analyze real-world situations. (P2.A)<br>● I can compose functions and determine that compositions are not always commutative. (P2.B)<br>● **I can develop and write two or more functions that can represent a given composite function. (P2.C)**<br>● **I can find the inverse of a function in multiple representations (graphs, tables and function rules).(P2.E)**<br>● I can determine if a function is invertible, restrict the domain if necessary, find the inverse function (in multiple representations). (P2.E)<br>● I can use compositions to check their inverses; when composed $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$. (P2.B, P2.E)I can fluently add, subtract, and multiply polynomials. (SAT)<br><br>**Unit 3: Conics**<br>Students will understand how conic sections are formed and the relationship to the graph and equation.<br>**Student Learning Objectives**:<br>● I can determine the conic section formed when a plane intersects a double-napped cone. (P.3F)<br>● I can connect the locus definition of conics to their rectangular equations. (P.3G)<br>● **I can use characteristics of conic sections, including ellipse and hyperbola, to write rectangular equations. (P.3H, P.3I)**<br>● I can create an equation to represent a circle in the xy-plane. (SAT)<br>● I can describe how a change to the equation representing a circle in the xy-plane affects the graph of the circle. (SAT)<br>● I can describe how a change in the graph of the circle affects the equation of the circle. (SAT)<br>● I understand that the ordered pairs that satisfy an equation of the form $(x-h)^2 + (y-k)^2 = r^2$ (SAT)<br>● I can complete the square in an equation representing a circle to determine the properties of the circle when it is graphed in the xy-plane, and use the distance formula in problems related to circles. (SAT) | **Chapter 1, Sections 3 and 6**<br><br>**Chapter 7** |
| 2 | **Unit 4: Polynomial and Power Functions, Equations, and Inequalities**<br>Students will graph and analyze key features of polynomial and power functions.<br>**Student Learning Objectives**:<br>● I can graph polynomial and power functions (P.2.F), and their transformations including $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of $a$, $b$, $c$, and $d$, in mathematical and real-world problems. (P.2.G)<br>● **I can determine shape, number of bends and end behavior. (P. 2I)**<br>● **I can determine and analyze domain, range, symmetry, relative maximum, relative minimum, zeros and intervals of increasing and decreasing behavior. (P. 2I)** | **Chapter 2** |

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| | • **I can analyze and describe end behavior of polynomials and power functions using infinity notation.(P. 2J)**<br>• I can graph polynomial and power functions and their transformations. (P.2G)<br>• I can analyze situations modeled by polynomials and power functions to solve real world problems. (P.2N, SAT)<br>• I can solve polynomial equations using graphs, tables and algebraic methods to determine real and complex roots, including factoring, analysis of coefficients, the quadratic formula, and synthetic substitution and division. (P.5J, SAT)<br>• I can solve polynomial inequalities using graphs, tables and algebraic methods including solving the related polynomial equation and testing the intervals between the solutions, and write the solution set in interval notation. (P.5K)<br>• I can fluently add, subtract, and multiply polynomials. (SAT)<br><br>**Unit 5: Rational Functions, Equations and Inequalities**<br>Students will graph and analyze rational functions and their transformations<br>**Student Learning Objectives**:<br>• **I can graph and analyze attributes of rational functions. (**P.2F, **P.2I)**<br>• I can graph transformations of Rational Functions. (P.2G)<br>• **I can describe end behavior using infinity notation. (P.2J)**<br>• I can analyze characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical, and oblique asymptotes. (P.2K)<br>• **I can determine the type of discontinuities and describe left and right-sided behavior around discontinuities. (**P.2L, **P.2M)**<br>• I can solve real world problems using Rational Functions and rational inequalities. (P.5L, SAT)<br>• I can write equivalent rational expressions using properties of operations. (SAT)<br><br>**Unit 6: Exponential and Logarithmic Functions and Equations**<br>In this unit students will apply their knowledge of inverses to logarithmic and exponential functions in multiple representations, they will apply their knowledge of transformations to help graph and write log and exponential functions, they will will analyze attributes of each function and they will generate and solve log and exponential equations in mathematical and real world situations.<br>**Student Learning Objectives**:<br>• I can determine an inverse for exponential and logarithmic functions and represent these inverse functions using multiple representations, including graphs, tables, and algebraic methods. (P.2E, P.2F))<br>• I can graph exponential and logarithmic functions and their transformations, including $af(x)$, $f(x) + d$, $f(x - c)$, and $f(bx)$ for specific values of $a$, $b$, $c$, and $d$, in mathematical and real-world problems(P.2G)<br>• **I can determine and analyze the key attributes of exponential and logarithmic functions (including domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, intervals over which** | **Chapter 2**<br><br>**Chapter 3** |

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| | **the function is increasing or decreasing, end behavior, and discontinuities) in mathematical and real-world problems. (P.2I)**<br>● **I can analyze and describe end behavior using infinity notation based on an analysis of the function type and constants used. (P.2J)**<br>● I can use the properties of logarithms (including product, quotient, power rule, and change of base) to evaluate or transform logarithmic expressions. (P.5G)<br>● I can generate and solve logarithmic and exponential equations in mathematical and real-world problems using algebraic, tabular, and graphical methods.(P.5H)<br>● I can identify and create equivalent expressions with rational exponents and radicals. (SAT) | |

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| 3 | **Unit 7: Problem Solving with Trigonometric Ratios**<br>Students will be able to determine the values of trigonometric ratios for right triangles, and use these ratios to solve mathematical and real world problems involving finding sides and angles.<br>**Student Learning Objectives**:<br>● **I can solve problems involving trigonometric ratios on the coordinate plane for both special angles and non-special angles.(**P.4A**, P.4E,** SAT**)**<br>● I can determine the values of the trigonometric functions at the special angles and relate them in mathematical and real-world problems. (P.2P, SAT)<br>● I can use trigonometry to explore connections with standard position rotation angles. (P.4C)<br>● **I can apply the Law of Sines and Law of Cosines in mathematical and real world problems. (P.4G, P.4H)**<br>● I can change the scale factor of all lengths by a factor of $k$ and know that all areas change by a factor of $k^2$, and changes all volumes by a factor of $k^3$, but all angles remain the same. (SAT)<br>● I can select the correct area or volume formula and correctly calculate for a specified value. (SAT)<br>● I can determine which statements may be required to prove certain relationships or to satisfy a given theorem. (SAT)<br>● I can know and apply the vertical angle theorem, triangle similarity and congruence criteria, triangle angle sum theorem, and the relationship of angles formed when a transversal cuts parallel lines. (SAT) | **Chapter 4, 5** |
| | **Unit 8: Trigonometric Functions**<br>Students will understand the attributes of trigonometric functions and their representations in graphs and equations.<br>**Student Learning Objectives**:<br>● I can graph Sine, Cosine and Tangent and their inverses. (P.2G, P.2H)<br>● I can graph transformations of Sine, Cosine and Tangent and their inverses transformations. (P.2G, P.2H)<br>● **I can analyze key attributes of trig function graphs and their inverses. (P.2I**, P.2H)<br>● **I can determine the relationship between the unit circle and the definition of a periodic function to evaluate trigonometric functions in mathematical and real-world problems (P.4A, SAT)**<br>● I can determine angle measures on the Unit circle in degree and radian measures and convert between the two measures. (P.4B, SAT)<br>● I can describe the relationship between angles in radians and degrees based on the concept of rotation, linear and angular velocity. (P.4D)<br>● I can find the measure of reference angles and angles in standard position. (P.4C)<br>● I can use definitions, properties, and theorems relating to circles and parts of circles, such as radii, diameters, tangents, angles, arcs, arc lengths, and sector areas to solve problems. | **Chapter 4** |
| | **Unit 9: Trigonometric Equations and Identities**<br>Students will be able to use trigonometric identities to simplify expressions and solve problems.<br>**Student Learning Objectives**:<br>● **I can use trig Identities to simplify expressions - sum and difference, law of sines, law of cosines. (P.5M)** | **Chapter 5** |

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| | ● I can generate and solve trigonometric equations to model real world problems. (P.5N) | |
| 4 | **Unit 10: Vectors**<br>Students will understand and be able to use vectors to model and solve real world problems.<br>**Student Learning Objectives**:<br>● I can represent angles in radians or degrees and convert from one form to the other. (P.4C)<br>● I can use trigonometry in mathematical and real-world problems, including directional bearing. (P.4F)<br>● **I can use vectors to model situations involving magnitude and direction. (P.4I)**<br>● I can represent addition and multiplication of vectors by scalar geometrically and symbolically. (P.4J)<br>**I can apply vector addition and multiplication in real world problems. (P.4K)**<br><br>**Unit 11: Parametric Equations**<br>Students will be able to represent and graph parametric equations and understand their relationship to rectangular equations and graphs<br>**Student Learning Objectives**:<br>● I can graph parametric equations by hand using tables and explore the characteristics of these equations, including the effect of the parameter *t* and the direction of the graph over time. (P.3A)<br>● I can compare parametric equations and their corresponding rectangular relations to determine what additional information is provided by parametric equations. (P.3B)<br>● **I can graph parametric equations using graphing technology and analyze these graphs to model and solve problem situations.** (P.3A, **P.3C)**<br>● I can explore the effect of the *t*-step value on the graph of a parametric equation created using graphing technology. (P.3A)<br>● I can convert parametric equations into rectangular relations, and convert rectangular relations into parametric equations. (P.3B, Nonlinear Equations and Systems 3)<br>● **I can use these parametric models to solve real-world problems. (P.3C,** Nonlinear Equations & Systems 1f**)**<br>● **I can model projectile motion with parametric equations and then use these models to solve real-world problems. (P.3C)**<br><br>**Unit 12: Polar Equations**<br>Students will be able to graph and analyze key features of polar relations and solve polar equations.<br>**Student Learning Objectives**:<br>● **I can graph points in the polar coordinate system, using both radians and degrees. (P.3D)**<br>● **I can convert between polar and rectangular coordinates. (P.3D)**<br>● I can convert between polar and rectangular equations. (P.3E)<br>● I can graph polar equations by plotting points and using technology. (P.3E)<br>● I can graph polar equations by creating a table of values and plotting the polar points. (P.3E) | **Chapter 8**<br><br>**Chapter 7**<br><br>**Chapter 8** |

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| | ● **I can determine the polar coordinates for points and discover multiple ways to identify the same point in polar coordinates. (P.3D)**<br>● I can explore various types of polar equations, including circles, cardioids, limacons, roses and lemniscates. (P.3E)<br><br>**Unit 13: Sequences, Series, and Binomial Expansions**<br>Students can write and evaluate arithmetic and geometric sequences and series.<br>**Student Learning Objectives**:<br>● I can represent arithmetic and geometric sequences using explicit and recursive formulas. (P.5B)<br>● I can represent arithmetic and geometric series with sigma notation. (P.5D)<br>● **I can evaluate finite sums written in sigma notation. (P.5A)**<br>● I can calculate the $n^{th}$ term and $n^{th}$ partial sum of an arithmetic sequence in real world problems. (P.5C)<br>● I can calculate the $n^{th}$ term and nth partial sum of a geometric series. (P.5E)<br>● I can find the sum of an infinite geometric series if it exists. (P.5E)<br>● **I can apply the Binomial Theorem. (P.5F)**<br>● I can compute and interpret probability in simple contexts. (SAT)<br>● I can understand and use formulas for probability and conditional probability in terms of frequency. (SAT) | **Chapter 10** |

***** Units may cross grading periods. Indicated here is in which grading period the unit generally will begin.