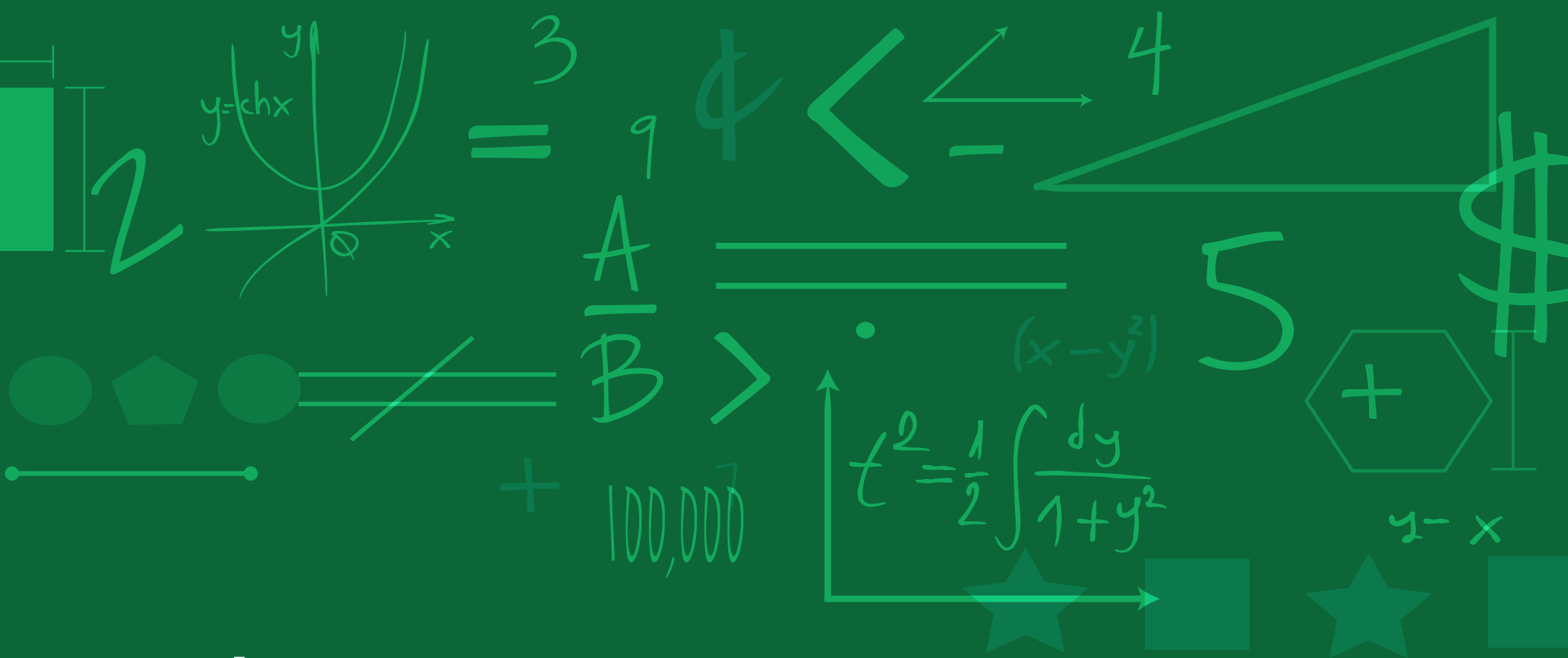

Mathematics TEKS
SUPPORTING INFORMATION

PRECALCULUS

Texas Education Agency

Precalculus – Mathematics

TEKS	Supporting Information
(a) General requirements. Students shall be awarded one-half to one credit for successful completion of this course. Prerequisites: Geometry and Algebra II.	The TEKS include descriptions of prerequisite coursework. Geometry and Algebra II are required prerequisites.
(b) Introduction. (1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on fluency and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.	A well-balanced mathematics curriculum includes the Texas College and Career Readiness Standards. A focus on mathematical fluency and solid understanding allows for rich exploration of the key ideas of Precalculus.
(b) Introduction. (2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	This paragraph occurs second in the TEKS, preceding the content descriptions. This highlights the emphasis of student use of the mathematical process standards to acquire and demonstrate mathematical understanding. The concepts of generalization and abstraction in the text from P(1)(B) included in the introductory paragraphs from elementary TEKS may be considered subsumed in this language. Computer programs may be included under technology in the text from P(1)(C). This introductory paragraph states, "Students will use mathematical relationships to generate solutions and make connections and predictions," instead of the text from P(1)(E).
(b) Introduction. (3) In Advanced Quantitative Reasoning, students will develop and apply skills necessary for college, careers, and life. Course content consists primarily of applications of high school mathematics concepts to prepare students to become well-educated and highly informed 21st century citizens. Students will develop and apply reasoning, planning, and communication to make decisions and solve problems in applied situations involving numerical reasoning, probability, statistical analysis, finance, mathematical selection, and modeling with algebra, geometry, trigonometry, and discrete mathematics.	Specifics about Precalculus mathematics content are summarized in this paragraph. This summary follows the paragraph about the mathematical process standards. This supports the notion that the TEKS should be learned in a way that integrates the mathematical process standards in an effort to develop fluency. The paragraph also connects the key concepts found in Precalculus to prior content and the Texas College and Career Readiness Standards.
(b) Introduction. (4) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	The State Board of Education approved the retention of some "such as" statements within the TEKS for clarification of content. The phrases "including" and "such as" should not be considered as limiting factors for the student expectations (SEs) in which they reside.

Additional Resources are available online including

Vertical Alignment Charts

Texas Mathematics Resource Page

Texas College and Career Readiness Standards

TEKS: Mathematical Process Standards.	Supporting Information
P(1)(A) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to apply mathematics to problems arising in everyday life, society, and the workplace.**	This SE emphasizes application. The opportunities for application have been consolidated into three areas: everyday life, society, and the workplace. This SE, when paired with a content SE, allows for increased relevance through connections within and outside mathematics. *Example*: When paired with P(3)(F), the student may be asked to determine if objects in art and architecture can be formed using a cross-section of a double-napped cone.
P(1)(B) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.**	This process standard applies the same problem-solving model and is included in the TEKS for kindergarten through grade 12. This is the traditional problem-solving process used in mathematics and science. Students may be expected to use this process in a grade appropriate manner when solving problems that can be considered difficult relative to the student's mathematical maturity.
P(1)(C) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense, as appropriate, to solve problems.**	The phrase "as appropriate" indicates that students are assessing which tools and techniques to apply rather than trying only one or all of those listed. *Example:* When paired with P(2)(O), students may be expected to determine the sinusoidal function that best models a situation using their knowledge of transformations and the attributes of the function as well as technology.
P(1)(D) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.**	Students may be expected to address three areas: mathematical ideas, reasoning, and implications of these ideas and reasoning. Communication can be through the use of symbols, diagrams, graphs, or language. The phrase "as appropriate" implies that students may be expected to assess which communication tool to apply rather than trying only one or all of those listed. The use of multiple representations includes translating and making connections among the representations. *Example*: When paired with P(2)(D), students may be expected to describe symmetry of functions by communicating mathematical ideas and reasoning using symbols, diagrams, graphs, and language related to even and odd functions.
P(1)(E) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to create and use representations to organize, record, and communicate mathematical ideas.**	Students are expected to use representations for three purposes: to organize, record, and communicate mathematical ideas. Representations include verbal, graphical, tabular, and algebraic representations. As students create and use representations, the students will evaluate the effectiveness of the representations to ensure that those representations are communicating mathematical ideas with clarity. *Example*: When paired with P(4)(F) and (I), students may be expected to organize various bits of information to solve a problem of magnitude and direction using directional bearing.
P(1)(F) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to analyze mathematical relationships to connect and communicate mathematical ideas.**	Students may be expected to analyze relationships and form connections with mathematical ideas. Students may form conjectures about mathematical representations based on patterns or sets of examples and non-examples. Forming connections with mathematical ideas extends past conjecturing to include verification through a deductive process. *Example*: When paired with P(5)(N), students may be expected to develop a trigonometric equation based upon a situation before providing a solution.
P(1)(G) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.**	The expectation is that students speak and write with precise mathematical language to explain and justify the work. This includes justifying a solution. *Example*: When paired with P(5)(M), the student may be expected to justify a trigonometric relationship using identities.

TEKS: Functions.	Supporting Information
P(2)(A) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to use the composition of two functions to model and solve real-world problems.**	When applying the composition of functions, students may be expected to model and solve real-world problems. In these situations, the problems are limited to the composition of two functions. This SE can be thought of as the inverse of P(2)(C).
P(2)(B) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to demonstrate that function composition is not always commutative.**	When paired with P(1)(D), students may be expected to demonstrate that commutative property does not always extend to composition of functions verbally, numerically, symbolically and graphically.
P(2)(C) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to represent a given function as a composite function of two or more functions.**	When paired with P(1)(D), students may be expected to represent the composition of functions verbally, numerically, symbolically, and graphically. This SE lays the ground work for the composition rule of derivatives in Calculus.
P(2)(D) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to describe symmetry of graphs of even and odd functions.**	When paired with P(1)(D), students may be expected to describe symmetry of functions by communicating mathematical ideas and reasoning using symbols, tables, diagrams, graphs, and language related to even and odd functions.
P(2)(E) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to determine an inverse function, when it exists, for a given function over its domain or a subset of its domain and represent the inverse using multiple representations.**	Specificity includes domain restrictions when determining inverse functions. Students may be expected to determine inverse functions over a subset of the domain of the related function. This SE extends the relationships between the domain and range of a function and its inverse found in Algebra II [2A(2)(C)].
P(2)(F) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to graph exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric, and piecewise defined functions, including step functions.**	Student expectation P(2)(F) builds on graphing functions from Algebra II [2A(2)(A); 2A(4)(C); 2A(6)(A), (C), and (G)]. This SE includes the first mentions of piecewise-defined functions and step functions in the TEKS.

TEKS: Functions.	Supporting Information
P(2)(G) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to graph functions, including exponential, logarithmic, sine, cosine, rational, polynomial, and power functions 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.**	The generic form of functions is referenced by name rather than algebraic representations of parent functions. This SE builds on transforming functions from Algebra II [2A(5)(A); 2A(6)(A), (C), and (G)]. Students may be expected to graph both the parent function and other forms of the identified functions from their respective algebraic representations. The transformation may be applied to any graph or portion of the graph of the indicated functions, including the graph or a portion of the graph of the parent function.
P(2)(H) **Functions**. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to graph arcsin *x* and arccos *x* and describe the limitations on the domain.**	When paired with P(1)(G), students may be asked to justify the limitations using the respective inverse functions. This SE is related to P(2)(E).
P(2)(I) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to determine and analyze the key features of exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric, and piecewise defined functions, including step functions such as domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, and intervals over which the function is increasing or decreasing.**	This SE builds on determining domain and range as wells as the analysis of key features in Algebra II [2A(2)(A) and (C); 2A(6)(K); and 2A(7)(I)]. The use of connections among multiple representations is subsumed within the analysis of key features of the stated functions. When paired with P(1)(D), students may be expected to determine and analyze key features by communicating mathematical ideas and reasoning using symbols, diagrams, graphs, and language reflecting appropriate academic vocabulary. Domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, and intervals over which the function is increasing or decreasing are illustrative examples of key features of the named functions. These examples serve to clarify what is meant by significant values of a function, points on the graph of a function, and attributes of the algebraic representation of these functions.
P(2)(J) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to analyze and describe end behavior of functions, including exponential, logarithmic, rational, polynomial, and power functions, using infinity notation to communicate this characteristic in mathematical and real-world problems.**	Although the term "limit" is not included in this SE, the foundation for understanding of the concept of a limit is being developed in P(2)(J) and (M). Infinity notation to represent end behavior is included.
P(2)(K) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to analyze characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical, and oblique asymptotes.**	Students may be expected to determine whether a discontinuity is a removable discontinuity or a non-removable discontinuity and connect this idea with limits, including left- and right-sided behavior of the function. When paired with P(1)(D), students may be expected to analyze end behavior, asymptotes, discontinuity, and left- and right-side behavior around a discontinuity, using multiple representations of the function.

TEKS: Functions.	Supporting Information
P(2)(L) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to determine various types of discontinuities in the interval (-∞, ∞) as they relate to functions and explore the limitations of the graphing calculator as it relates to the behavior of the function around discontinuities.**	Students may be expected to determine whether a discontinuity is a removable discontinuity or a non-removable discontinuity and connect this idea with limits, including left- and right-sided behavior of the function. When paired with P(1)(D), students may be expected to analyze end behavior, asymptotes, discontinuity and left- and right-side behavior around a discontinuity using multiple representations of the function.
P(2)(M) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to describe the left-sided behavior and the right-sided behavior of the graph of a function around discontinuities.**	Although the term "limit" is not included in this SE, the foundation for understanding of the concept of a limit is being developed in P(2)(J) and (M). Students may be expected to determine whether a discontinuity is a removable discontinuity or a non-removable discontinuity and connect this idea with limits, including left- and right-sided behavior of the function. When paired with P(1)(D), students may be expected to analyze end behavior, asymptotes, discontinuity and left- and right-side behavior around a discontinuity using multiple representations of the function.
P(2)(N) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to analyze situations modeled by functions, including exponential, logarithmic, rational, polynomial, and power functions, to solve real-world problems.**	Students may be expected to analyze the attributes of a problem situation, determine which type of function models the situation, and write that function. When paired with P(1)(C), students may be expected to determine the function that best models a situation using their knowledge of transformations and the attributes of the function as well as technology. The SE indicates which functions should be used as contexts for situations relating to real-world problems. When paired with P(1)(A), (D), (E), and (F), students may be expected to model real-world data using the stated functions.
P(2)(O) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to develop and use a sinusoidal function that models a situation in mathematical and real-world problems.**	Students may be expected to analyze the attributes of a problem situation, determine which type of function models the situation, and write that function. When paired with P(1)(C), students may be expected to determine the function that best models a situation using their knowledge of transformations and the attributes of the function as well as technology. Functions that should be used as contexts for situations relating to real-world problems are included. When paired with P(1)(A), (D), (E), and (F), students may be expected to model real-world data using the stated functions.
P(2)(P) **Functions.** The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems. **The student is expected to determine the values of the trigonometric functions at the special angles and relate them in mathematical and real-world problems.**	"Special angles" refer to 0°, 30°, 45°, 60°, 90°, and their integer multiples.

TEKS: Relations and geometric reasoning.	Supporting Information
P(3)(A) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to graph a set of parametric equations**.	When paired with P(1)(C), students may be expected to graph parametric equations with and without the use of graphing technology. Students may be expected to graph directly from the parametric form of the equation, as well as convert parametric equations to the rectangular equation and then graph the locus of points for that equation.
P(3)(B) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to convert parametric equations into rectangular relations and convert rectangular relations into parametric equations.**	When paired with P(1)(C), students may be expected to choose one of several techniques to accomplish this conversion.
P(3)(C) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to use parametric equations to model and solve mathematical and real-world problems.**	When paired with P(1)(A), students may be expected to use parametric equations to model problems that involve motion. Students may be expected to model applications other than motion.
P(3)(D) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to graph points in the polar coordinate system and convert between rectangular coordinates and polar coordinates.**	When paired with P(1)(D), the students may be expected to compare the different representation of coordinates in a table. This could include rectangular or polar using either radian or degree measures.
P(3)(E) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to graph polar equations by plotting points and using technology.**	When paired with P(1)(C), the student may be expected to determine which technique is more appropriate for a given situation.
P(3)(F) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to determine the conic section formed when a plane intersects a double-napped cone.**	When paired with P(1)(A), the student may be asked to determine if objects in art and architecture can be formed using a cross-section of a double-napped cone.
P(3)(G) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to make connections between the locus definition of conic sections and their equations in rectangular coordinates.**	Making connections between the locus definition of conic sections and their equations in rectangular coordinates builds on Algebra II's focus on parabolas and Geometry's focus on circles [2A(4)(B) and G(12)(E)].
P(3)(H) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to use the characteristics of an ellipse to write the equation of an ellipse with center (*h*, *k*).**	When paired with P(1)(A), the student may be expected to determine the equation that represents any of the orbits of the planets giving the appropriate information.
P(3)(I) **Relations and geometric reasoning**. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. **The student is expected to use the characteristics of a hyperbola to write the equation of a hyperbola with center (*h*, *k*).**	When paired with P(1)(G), the student may be asked to explain how a change in the characteristics of the hyperbola may change the corresponding equation.

TEKS: Number and measure.	Supporting Information
P(4)(A) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to determine the relationship between the unit circle and the definition of a periodic function to evaluate trigonometric functions in mathematical and real-world problems.**	The focus of this SE is on the unit circle and applications of the trigonometric function upon circles. The use of trigonometric functions and angle ratios can be found in P(4)(E), whereas solving trigonometric equations is in P(5)(N).
P(4)(B) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to describe the relationship between degree and radian measure on the unit circle.**	Specificity includes the unit circle and the relationship between degree and radian measures. This SE builds upon the grade 4 skills [4(7)(A) and (B)].
P(4)(C) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to represent angles in radians or degrees based on the concept of rotation and find the measure of reference angles and angles in standard position.**	The concept of rotation and its relationship to radian and degree angle measures is addressed.
P(4)(D) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to represent angles in radians or degrees based on the concept of rotation in mathematical and real-world problems, including linear and angular velocity.**	The concept of rotation and its relationship to radian and degree angle measures is addressed. The types of real-world problems include linear and angular velocity and may include directional bearing.
P(4)(E) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to determine the value of trigonometric ratios of angles and solve problems involving trigonometric ratios in mathematical and real-world problems.**	Student are introduced to the trigonometric ratios in Geometry [G(9)(A)].
P(4)(F) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to use trigonometry in mathematical and real-world problems, including directional bearing.**	When paired with P(1)(E) and P(4)(I), students may be expected to organize various bits of information to solve a problem of directional bearing.
P(4)(G) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to use the Law of Sines in mathematical and real-world problems.**	Students may be expected to use other properties of trigonometric functions, such as the Law of Sines, to determine angle measure, then answer questions regarding magnitude.
P(4)(H) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to use the Law of Cosines in mathematical and real-world problems.**	Students may be expected to use other properties of trigonometric functions, such as the Law of Cosines, to determine side lengths, then answer questions regarding area.
P(4)(I) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to use vectors to model situations involving magnitude and direction.**	Students may be expected to use properties of trigonometric functions, such as the Law of Cosines, to determine side lengths, and then answer questions regarding area.

TEKS: Number and measure.	Supporting Information
P(4)(J) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to represent the addition of vectors and the multiplication of a vector by a scalar geometrically and symbolically.**	The means by which a student may be expected to represent vector problems is included. When paired with P(1)(A) and (B), students may be expected to use vector addition and multiplication to solve real-world problems.
P(4)(K) **Number and measure**. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. **The student is expected to apply vector addition and multiplication of a vector by a scalar in mathematical and real-world problems.**	The means by which a student may be expected to represent vector problems is included. When paired with P(1)(A) and (B), students may be expected to use vector addition and multiplication to solve real-world problems.

TEKS: Algebraic Reasoning.	Supporting Information
P(5)(A) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to evaluate finite sums and geometric series, when possible, written in sigma notation.**	When paired with P(1)(A) and (B), students may be expected to solve real-world problems involving series. Specificity has been added to calculate the value of the n^{th} term, the sum, and partial sum of arithmetic and geometric series.
P(5)(B) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to represent arithmetic sequences and geometric sequences using recursive formulas.**	Specificity includes the use of recursive formulas to represent sequences. This SE builds upon the recursive form of a sequence from Algebra I [A(12)(C)].
P(5)(C) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to calculate the n^{th} term and the n^{th} partial sum of an arithmetic series in mathematical and real-world problems.**	When paired with P(1)(A) and (B), students may be expected to solve real-world problems involving series. Specificity includes the use of the value of the n^{th} term, the sum, and partial sum of arithmetic series.
P(5)(D) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to represent arithmetic series and geometric series using sigma notation.**	The use of sigma notation to represent series is included. When paired with P(1)(A), students may be expected to represent real-world problems involving series.
P(5)(E) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to calculate the n^{th} term of a geometric series, the n^{th} partial sum of a geometric series, and sum of an infinite geometric series when it exists.**	When paired with P(1)(A) and (B), students may be expected to solve real-world problems involving series. The use of the value of the n^{th} term, the sum, and partial sum of geometric series is included. Determining if the sum of an infinite geometric series exists includes investigating whether the series is divergent or convergent.
P(5)(F) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to apply the Binomial Theorem for the expansion of $(a + b)^n$ in powers of a and b for a positive integer n, where a and b are any numbers.**	When paired with P(1)(A) and (B), students may be expected to solve mathematical and real-world problems involving binomial expansion.
P(5)(G) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to use the properties of logarithms to evaluate or transform logarithmic expressions.**	Specificity includes the use of logarithmic properties to simplify expressions. The expression may be one part of an equation. The use of properties of logarithms to evaluate or transform logarithmic expressions is included. Exponential properties are explicitly stated in A(11)(B). Students are expected to apply their knowledge of the exponent properties to the logarithmic properties.

TEKS: Algebraic Reasoning.	Supporting Information
P(5)(H) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to generate and solve logarithmic equations in mathematical and real-world problems.**	Generating and solving logarithmic equations builds on Algebra II [2A(5)(B), (C), (D), and (E)].
P(5)(I) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to generate and solve exponential equations in mathematical and real-world problems.**	Generating and solving exponential equations builds on Algebra II [2A(5)(B), (C), and (D)].
P(5)(J) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to solve polynomial equations with real coefficients by applying a variety of techniques in mathematical and real-world problems.**	Solving polynomial equations builds on Algebra II [2A(7)(B), (C), (D), and (E)].
P(5)(K) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to solve polynomial inequalities with real coefficients by applying a variety of techniques and write the solution set of the polynomial inequality in interval notation in mathematical and real-world problems.**	Generating and solving polynomial inequalities builds on Algebra II [2A(4)(H); 2A(7)(B), (C), (D), and (E)].
P(5)(L) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to solve rational inequalities with real coefficients by applying a variety of techniques and write the solution set of the rational inequality in interval notation in mathematical and real-world problems.**	Solving rational polynomial inequalities builds on Algebra II [2A(7)(F)].
P(5)(M) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to use trigonometric identities such as reciprocal, quotient, Pythagorean, cofunctions, even/odd, and sum and difference identities for cosine and sine to simplify trigonometric expressions.**	Specificity includes the use of trigonometric identities to simplify expressions. The process of simplifying expressions may include the verification of trigonometric identities. The expression may be one part of an equation. Specificity for trigonometric identities includes reciprocal, quotient, Pythagorean, cofunctions, even/odd, and sum and difference identities for cosine and sine.
P(5)(N) **Algebraic reasoning**. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms. **The student is expected to generate and solve trigonometric equations in mathematical and real-world problems.**	Specificity includes generating and solving equations as part of solving problems. This SE is more general than P(4)(A) as mathematical and real-world problems do not necessarily involve the unit circle.