Core Resources Available for Teachers for Instruction:

Text: *Precalculus with Limits* Larson, et al

worksheets

Marking Period	Unit Name	Objectives	Standards	Vocabulary	Assessments	Timeline
3	Polar geometry, polar coordinates	Students will learn how to plot polar points, change points from polar coordinates into rectangular and from rectangular into polar, change equations from polar into rectangular and from rectangular into polar, and to graph and identify polar graphs using graphing calculators.	PA Common Core Standards (CC) CC.2.1.HS.A.1 CC.2.1.HS.A.2 CC.2.1.HS.A.3 PA CC Anchors/ Eligible Content CC.2.1.HS.A.1	polar graphing, polar axis, pole, directed distance, directed angle, polar coordinates, rectangular coordinates, polar equations, rectangular equations, rose curves, circles, limacons, lemniscates, parabolic spirals, spiral of Archimedes	Chapter Test	11 days

3	Functions	Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations. Mathematical functions are relationships that assign each member of one set (domain) to a unique member of another set (range), and the relationship is recognizable across representations. Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real world situations.	PA Common Core Standards (CC) A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or	relation, function, domain, relation, inverse function, even function, odd function, piecewise-defined functions, transformations of functions, composition of functions.	Chapter Test	13 days

			a table). A1.2.1.2.1 Create, interpret and/or use the equation, graph or table of a linear function. A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table and equation). A1.2.2.1.1 Identify, describe and/or use constant rates of change. A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or			

			identify a linear equation when given • the graph of the line • 2 points on the line, or • the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph. A2.1.3.1.1 Write and/or			

			solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x - 2) = 1$ or $\sqrt{(x^2 + 21x)} = 14$). A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve			

			and/or apply linear or exponential growth or decay (including problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1 Analyze a set of			

			data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20^{th} term). A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or			

			determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an			

			exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one represent			

			ation to another (graph, table and equation). CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.4 Interpret the effects transformations have on functions			

			and find the inverses of functions. G.2.2.2.1 Estimate area, perimeter or circumference of an irregular figure. G.2.2.2.2 Find the measurement of a missing length given the perimeter, circumference, or area. G.2.2.2.3 Find the side lengths of a polygon with a given perimeter to maximize the area of the polygon. G.2.2.2.4 Develop and/or use strategies to estimate			

			the area of a compound /composite figure. G.2.2.2.5 Find the area of a sector of a circle.			
3	Solving equations and inequalities. Graphing rational and polynomial functions,	The students will learn how to solve different types of equations and inequalities and how to graph rational and polynomial functions.	PA Common Core Standards (CC) A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.	linear equations, quadratic equations, radical equations, rational equations, absolute value equations, linear inequalities, absolute value inequalities, polynomial inequalities, rational inequalities, graphing polynomial and rational functions, factoring, asymptotes, extreme behavior	Chapter Test	15 days

			3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table). A1.2.1.2.1 Create, interpret and/or use the equation, graph or table of a linear function. A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table and equation). A1.2.2.1.1 Identify, describe and/or use constant rates of change.			

			A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or identify a linear equation when given • the graph of the line • 2 points on the line, or • the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine			

			the slope and/or y-intercept represented by a linear equation or graph. A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x - 2) = 1$ or $\sqrt{(x^2 + 21x)} = 14$). A2.1.3.1.3 Write and/or solve a simple exponential or			

			logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes			

			to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20^{th} term).			

			A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including			

			quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.			

			4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different			

			represent ations. CC.2.2.HS .C.4 Interpret the effects transform ations have on functions and find the inverses of functions. G.2.2.2.1 Estimate area, perimeter or circumfer ence of an irregular figure. G.2.2.2.2 Find the measure ment of a missing length given the perimeter, circumfer ence, or area. G.2.2.2.3 Find the side lengths of a polygon with a given perimeter to			

			maximize the area of the polygon. G.2.2.2.4 Develop and/or use strategies to estimate the area of a compound /composite figure. G.2.2.2.5 Find the area of a sector of a circle.			
3-4	Conic sections	Students will learn definitions for each conic section, both as a conic section and as a locus of points. Students will also learn how to graph all conic sections given the equation and to give the equation of the conic section given the graph. The students will also learn how to determine the eccentricity of an ellipse.	PA Common Core Standards (CC) CC.2.3 Geometry CC.2.3.HS.A.10 Translate between the geometric description and the equation for a conic section. CC.2.3.HS.A	conic section, locus of points, circle, parabola, hyperbola, ellipse, directed distance, vertex, focus, axis of symmetry, major axis, minor axis, conjugate axis, transverse axis, eccentricity	Chapter Test	13 days

			.14 Apply geometric concepts to model and solve real world problems.			
4	Exponential and logarithmic functions	Students will learn how to simplify exponential and logarithmic expressions, solve exponential and logarithmic equations, and graph exponential and logarithmic functions. The students will also learn how to solve word problems involving exponential and logarithmic functions, including compound interest.	PA Common Core Standards (CC) A1.2.2.1.1 Identify, describe and/or use constant rates of change. A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or identify a linear equation when	base, exponent, logarithm, natural base, natural log, properties of logarithms, change-base formula, asymptotes, graphs of exponential and logarithmic functions, compound interest	Chapter Test	10 days

			given • the graph of the line • 2 points on the line, or • the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph. A2.1.3.1.1 Write and/or solve quadratic equations (including			

			factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x - 2) = 1$ or $\sqrt{(x^2 + 21x)} = 14$). A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve and/or apply linear or exponenti			

			al growth or decay (including problem situations). A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20^{th} term). A2.2.1.1.3			

			Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics).			

			A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4			

			Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). CC.2.2.HS.C.5 Construct and compare linear, quadratic and exponential models to solve problems.			
4	Limits	Students will learn to define and evaluate limits algebraically and graphically.	PA Common Core Standards (CC) CC.2.1.HS.A.1	limits, infinitesimally, indeterminate form, substitution,	Chapter Test	9 days
4	Derivative	Students will learn how to differentiate a function by the definition of derivative and by applying some of the various shortcuts:	PA Common Core Standards (CC) CC.2.1.HS	Limit, power rule, quotient rule, product rule, chain rule	Chapter Test	Approximately 9 days, if time

		power rule, product rule, quotient rule, and chain rule	.A.1			permits