Pre-Calculus
Poudre School District
Pacing Overview

Section	Title	Pacing	Notes
Semester 1			
Algebra Review (Appendix) 18 days			
A.3	Polynomials	1 day	
A.4	Synthetic Division	1 day	
A.5	Rational Expressions	1 day	
A.6	Solving Equations	1 day	
Functions and Their Graphs (Chapter 1.1, 1.3-1.4 and Chapter 2) 10 days			
1.1	The Distance and Midpoint Formulas	1 day	
1.4	Circles		
1.3	Lines	1 day	
2.1	Functions	1 day	
2.2	The Graph of a Function	1 day	
2.3	Properties of Functions	1 day	*Introduce Regression Models (calc)*
2.4	Library of Functions; Piecewise-defined Functions	2 days	
2.5	Graphing Techniques: Transformations	1 day	
2.6	Mathematical Models: Building Functions		*Time Permitting*
Linear and Quadratic Functions (Chapter 3) 8 days			
3.1	Properties of Linear Functions and Linear Models	1 day	
3.2	Building Linear Models from Data	1 day	
3.3	Quadratic Functions and Their Properties	1 day	
3.4	Build Quadratic Models from Verbal Descriptions and from Data	2 days	
3.5	Inequalities Involving Quadratic Functions	1 day	
Polynomial and Rational Functions (Chapter 4) 8 days			
4.1	Polynomial Functions and Models	1 day	
4.2	Properties of Rational Functions	1 day	
4.3	The Graph of a Rational Function	1 day	
4.4	Polynomial and Rational Inequalities	1 day	
4.5	The Real Zeros of a Polynomial Function	1 day	
4.6	Complex Zeros; Fundamental Theorem of Algebra	1 day	
Exponential and Logarithmic Functions (Chapter 5) 10 days			
5.1	Composite Functions	0.5 day	
5.2	One-to-One Functions; Inverse Functions	1 day	
5.3	Exponential Functions	1 day	
5.4	Logarithmic Functions	1 day	
5.5	Properties of Logarithms	1 day	
5.6	Logarithmic and Exponential Equations	1 day	
5.7	Financial Models	1 day	
5.8	Exponential Growth and Decay Models; Newton's Law; Logistic Growth and Decay	1 day	

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Section	Title	Pacing	Notes
Semester 1 (continued)			
Systems & Sequences and Series (Chapter 11.5-11.6 and Chapter 12.1 – 12.4) 6 days			
11.5	Partial Fraction Decomposition	2 days	*May be covered during an end-of-year review*
11.6	Systems of Nonlinear Equations	1 day	
12.1	Sequences	1 day	
12.2	Arithmetic Sequences	1 day	
12.3	Geometric Sequences; Geometric Series	1 day	
12.4	Mathematical Induction		*Teacher Discretion*
12.5	The Binomial Theorem		

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Section	Title	Pacing	Notes
Semester 2			
Conics (Chapter 10.2 - 10.4) 6 days (January 9 – January 24)			
10.2	The Parabola	1 day	
10.3	The Ellipse	1.5 days	
10.4	The Hyperbola	1.5 days	
Trigonometric Functions (Chapter 6) 10 days (January 25 – February 16)			
6.1	Angles and Their Measure	1 day	
6.2	Trigonometric Functions: Unit Circle Approach	2 days	*supplement*
6.3	Properties of the Trigonometric Functions	2 days	
6.4	Graphs and the Sine and Cosine Functions	1 day	
6.5	Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions	1 day	
6.6	Phase Shift; Sinusoidal Curve Fitting	1 day	
Analytic Trigonometry (Chapter 7) 9 days (February 20 – March 9)			
7.1	The Inverse Sine, Cosine, and Tangent Functions	0.5 days	
7.2	The Inverse Trigonometric Functions (continued)	0.5 days	
7.3	Trigonometric Equations	2 days	
7.4	Trigonometric Identities	1 day	
7.5	Sum and Difference Formulas	1 day	
7.6	Double-angle and Half-angle Formulas	1 day	
7.7	Product-to-Sum and Sum-to-Product Formulas	1 day	*Time permitting*
Applications of Trig Functions (Chapter 8) 6 days (March 19 – March 30)			
8.1	Right Triangle Trigonometry; Applications	1 day	
8.2	The Law of Sines	1 day	
8.3	The Law of Cosines	1 day	
8.4	Area of a Triangle	1 day	
Polar Coordinates (Chapter 9.1 - 9.3) 7 days (April 2 – April 18)			
9.1	Polar Coordinates	1 day	
9.2	Polar Equations and Graphs	2.5 days	*Desmos Lab (FCHS)*
9.3	The Complex Plane; DeMoivre's Theorem	2 days	
Vectors (Chapter 9.4 – 9.7) 6 days (April 19 – May 2)			
9.4	Vectors	1.5 days	*If time allows/school choice*
9.5	The Dot Product	1 day	
9.6	Vectors in Space	1 day	
9.7	The Cross Product	1 day	
Review Chapter 10 (Chapter 10.5 – 10.6) 6 days (May 3 – May 16)			
10.5	Rotation of Axes; General Form of a Conic	2 days	*Teacher discretion*
10.6	Polar Equations of Conics	2 days	

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Algebra Review (Appendix)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
A.3	Polynomials	1. Recognize Monomials 2. Recognize Polynomials 3. Know Formulas for Special Products 4. Divide Polynomials Using Long Division 5. Factor Polynomials 6. Complete the Square	1 day
A.4	Synthetic Division	1. Divide Polynomials Using Synthetic Division	1 day
A.5	Rational Expressions	1. Reduce a Rational Expression to Lowest Terms 2. Multiply and Divide Rational Expressions 3. Add and Subtract Rational Expressions 4. Use the Least Common Multiple Method 5. Simplify Complex Rational Expressions	1 day
A.6	Solving Equations	1. Solve Equations by Factoring 2. Solve Equations Involving Absolutely Value 3. Solve a Quadratic Equation by Factoring 4. Solve a Quadratic Equation by Completing the Square 5. Solve a Quadratic Equation Using the Quadratic Formula	1 day

Total: 6 days

Note: Additional days reserved for review and assessment.

Things to Know

Standards	
HS.A-APR.D.7 (+)	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

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Functions and Their Graphs (Chapter 1.1, 1.3-1.4 and Chapter 2)
10 days

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
Chapter 1: Graphs			
1.1 1.4	The Distance and Midpoint Formulas Circles	1. Use the Distance Formula 2. Use the Midpoint Formula 1. Write the Standard Form of the Equation of a Circle 2. Graph a Circle 3. Work with the General Form of the Equation of a Circle	1 day
1.3	Lines	1. Calculate and Interpret the Slope of a Line 2. Graph Lines Given a Point and the Slope 3. Find the Equation of a Vertical Line 4. Use the Point-Slope Form of a Line; Identify Horizontal Lines 5. Find the Equation of a Line Given Two Points 6. Write the Equation of a Line in Slope-Intercept Form 7. Identify the Slope and y-Intercept of a Line from Its Equation 8. Graph Lines Written in General Form Using Intercepts 9. Find Equations of Parallel Lines 10. Find Equations of Perpendicular Lines	1 day

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
Chapter 2: Functions and Their Graphs			
2.1	Functions	1. Determine Whether a Relation Represents a Function 2. Find the Value of a Function 3. Find the Difference Quotient of a Function 4. Find the Domain of a Function Defined by an Equation 5. Form the Sum, Difference, Product, and Quotient of Two Functions	1 day
2.2	The Graph of a Function	1. Identify the Graph of a Function 2. Obtain Information from or about the Graph of a Function	1 day
2.3	Properties of Functions *Note: Introduce Regression Models (calc)*	1. Determine Even and Odd Functions from a Graph 2. Identify Even and Odd Functions from an Equation 3. Use a Graph to Determine Where a Function is Increasing, Decreasing, or Constant 4. Use a Graph to Locate Local Maxima and Local Minima 5. Use a Graph to Locate the Absolute Maximum and the Absolute Minimum 6. Use a Graphing Utility to Approximate Local Maxima and Local Minima and to Determine Where a Function is Increasing or Decreasing 7. Find the Average Rate of Change of a Function	1 day
2.4	Library of Functions; Piecewise-defined Functions	1. Graph the Functions Listed in the Library of Functions 2. Graph Piecewise-defined Functions	2 days
2.5	Graphing Techniques: Transformations	1. Graph Functions Using Vertical and Horizontal Shifts 2. Graph Functions Using Compressions and Stretches 3. Graph Functions Using Reflections bout the x-Axis and the y-Axis	1 day
2.6	Mathematical Models: Building Functions	1. Build and Analyze Functions	*time permitting*

Total: 8 days

Note: Additional days reserved for review and assessment.

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Things to Know		
Absolute Maximum	Absolute Minimum	Average Rate of Change of a Function
Constant Function	Decreasing Function	Difference Quotient of f
Distance Formula	Domain	Equations of the Unit Circle
Even Function	Function	Function Notation
General Form of the Equation of a Circle	General Form of the Equation of a Line	Horizontal Line
Increasing Function	Local Maximum	Local Minimum
Midpoint Formula	Odd Function	Parallel Lines
Perpendicular Lines	Point-Slope Form of an Equation of a Line	Slope
Slope-Intercept Form of the Equation of a Line	Standard Form of the Equation of a Circle	Vertical Line
Vertical-line Test		

Standards	
HS.N-CN.B.6 (+)	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
HS.G-C.A.4 (+)	Construct a tangent line from a point outside a given circle to the circle.

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Linear and Quadratic Functions (Chapter 3)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
3.1	Properties of Linear Functions and Linear Models	1. Graph Linear Functions 2. Use Average Rate of Change to Identify Linear Functions 3. Determine Whether a Linear Function is Increasing, Decreasing, or Constant 4. Build Linear Models from Verbal Descriptions	1 day
3.2	Building Linear Models from Data	1. Draw and Interpret Scatter Diagrams 2. Distinguish Between Linear and Nonlinear Relations 3. Use a Graphing Utility to Find the Line of Best Fit	1 day
3.3	Quadratic Functions and Their Properties	1. Graph a Quadratic Function Using Transformations 2. Identify the Vertex and Axis of Symmetry of a Quadratic Function 3. Graph a Quadratic Function Using Its Vertex, Axis, and Intercepts 4. Find a Quadratic Function Given Its Vertex and One Other Point 5. Find the Maximum or Minimum Value of a Quadratic Function	1 day
3.4	Build Quadratic Models from Verbal Descriptions and from Data	1. Build Quadratic Models from Verbal Descriptions 2. Build Quadratic Models from Data	2 days
3.5	Inequalities Involving Quadratic Functions	1. Solve Inequalities Involving a Quadratic Function	1 day

Total: 6 days

Note: Additional days reserved for review and assessment.

Things to Know	
Linear Function	Quadratic Functions

Standards	
HS.N-CN.A.3 (+)	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

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Polynomial and Rational Functions (Chapter 4)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
4.1	Polynomial Functions and Models	1. Identify Polynomial Functions and Their Degree 2. Graph Polynomial Functions Using Transformations 3. Know Properties of the Graph of a Polynomial Function 4. Analyze the Graph of a Polynomial Function 5. Build Cubic Models from Data	1 day
4.2	Properties of Rational Functions	1. Find the Domain of a Rational Function 2. Find the Vertical Asymptotes of a Rational Function 3. Find the Horizontal or Oblique Asymptote of a Rational Function	1 day
4.3	The Graph of a Rational Function	1. Analyze the Graph of a Rational Function 2. Solve Applied Problems Involving Rational Functions	1 day
4.4	Polynomial and Rational Inequalities	1. Solve Polynomial Inequalities 2. Solve Rational Inequalities	1 day
4.5	The Real Zeros of a Polynomial Function	1. Use the Remainder and Factor Theorem 2. Use Descartes' Rule of Signs to Determine the Number of Positive and the Number of Negative Real Zeros of a Polynomial Function 3. Use the Rational Zeros Theorem to List the Potential Rational Zeros of a Polynomial Function 4. Find the Real Zeros of a Polynomial Function 5. Solve Polynomial Equations 6. Use the Theorem for Bounds on Zeros 7. Use the Intermediate Value Theorem	1 day
4.6	Complex Zeros; Fundamental Theorem of Algebra	1. Use the Conjugate Pairs Theorem 2. Find the Polynomial Function with Specified Zeros 3. Find the Complex Zeros of a Polynomial Function	1 day

Total: 6 days

Note: Additional days reserved for review and assessment.

Things to Know		
Conjugate Pairs Theorem	Descartes' Rule of Signs	Factor Theorem
Fundamental Theorem of Algebra	Intermediate Value Theorem	Polynomial Function
Power Function	Rational Function	Rational Zeros Theorem
Real Zeros of a Polynomial Function f	Remainder Theorem	

Standards	
HS.N-VM.C.9 (+)	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
HS.F-IF.C.7d (+)	Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

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Exponential and Logarithmic Functions (Chapter 5)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
5.1	Composite Functions	1. Form a Composite Function 2. Find the Domain of a Composite Function	0.5 day
5.2	One-to-One Functions; Inverse Functions	1. Determine Whether a Function is One-to-One 2. Determine the Inverse of a Function Defined by a Map or a Set of Ordered Pairs 3. Obtain the Graph of the Inverse Function from the Graph of the Function 4. Find the Inverse of a Function Defined by an Equation	1 day
5.3	Exponential Functions	1. Evaluate Exponential Functions 2. Graph Exponential Functions 3. Define the Number *e* 4. Solve Exponential Equations	1 day
5.4	Logarithmic Functions	1. Change Exponential Statements to Logarithmic Statements and Logarithmic Statements to Exponential Statements 2. Evaluate Logarithmic Expressions 3. Determine the Domain of a Logarithmic Function 4. Graph Logarithmic Functions 5. Solve Logarithmic Equations	1 day
5.5	Properties of Logarithms	1. Work with the Properties of Logarithms 2. Write a Logarithmic Expression as a Sum or Difference of Logarithms 3. Write a Logarithmic Expression as a Single Logarithm 4. Evaluate Logarithms Whose Base is Neither 10 nor *e*	1 day
5.6	Logarithmic and Exponential Equations	1. Solve Logarithmic Equations 2. Solve Exponential Equations 3. Solve Logarithmic and Exponential Equations Using a Graphing Utility	1 day

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
5.7	Financial Models	1. Determine the Future Value of a Lump Sum of Money 2. Calculate Effective Rates of Return 3. Determine the Present Value of a Lump Sum of Money 4. Determine the Rate of Interest or the Time Required to Double a Lump Sum of Money	1 day
5.8	Exponential Growth and Decay Models; Newton's Law; Logistic Growth and Decay Models	1. Find Equations of Populations That Obey the Law of Uninhibited Growth 2. Find Equations of Populations That Obey the Law of Decay 3. Use Newton's Law of Cooling 4. Use Logistic Models	1 day

Total: 7.5 days

Note: Additional days reserved for review and assessment.

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Things to Know		
Change-of-Base Formula	Composite Function	Compound Interest Formula
Continuous Compounding	Effective Rate of Interest	Horizontal-Line Test
Inverse Function f^{-1} of f	Logistic Model	Natural Logarithm
Newton's Law of Cooling	Number e	One-to-One Function
Present Value Formulas	Properties of the Exponential Function	Properties of the Logarithmic Function
Properties of Logarithms	Property of Exponents	Uninhibited Growth and Decay

Standards	
HS.F-BF.A.1c (+)	Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
HS.F-BF.B.4b (+)	Verify by composition that one function is the inverse of another.
HS.F-BF.B.4c (+)	Read values of an inverse function from a graph or a table, given that the function has an inverse.
HS.F-BF.B.4d (+)	Produce an invertible function from a non-invertible function by restricting the domain.
HS.F-BF.B.5 (+)	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
HS.S-MD.A.1 (+)	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

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Systems & Sequences and Series (Chapter 11.5-11.6 and Chapter 12.1-12.4)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
Chapter 11: Systems of Equations and Inequalities **NOTE: If there is not time to complete Chapter 11 during semester 1, it may be moved and covered during an end-of-year review.*			
11.5	Partial Fraction Decomposition	1. Decompose P/Q Where Q Has Only Nonrepeated Linear Factors 2. Decompose P/Q Where Q Has Repeated Linear Factors 3. Decompose P/Q Where Q Has a Nonrepeated Irreducible Quadratic Factor 4. Decompose P/Q Where Q Has a Repeated Irreducible Quadratic Factor	2 days
11.6	Systems of Nonlinear Equations	1. Solve a System of Nonlinear Equations Using Substitution 2. Solve a System of Nonlinear Equations Using Elimination	1 day
Chapter 12: Sequences; Induction; the Binomial Theorem			
12.1	Sequences	1. Write the First Several Terms of a Sequence 2. Write the Terms of a Sequence Defined by a Recursive Formula 3. Use Summation Notation 4. Find the Sum of a Sequence	1 day
12.2	Arithmetic Sequences	1. Determine Whether a Sequence is Arithmetic 2. Find a Formula for an Arithmetic Sequence 3. Find the Sum of an Arithmetic Sequence	1 day
12.3	Geometric Sequences; Geometric Series	1. Determine Whether a Sequence is Geometric 2. Find a Formula for a Geometric Sequence 3. Find the Sum of a Geometric Sequence 4. Determine Whether a Geometric Series Converges or Diverges 5. Solve Annuity Problems	1 day

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
12.4	Mathematical Induction	1. Prove Statements Using Mathematical Induction	*Teacher Discretion*
12.5	The Binomial Theorem	1. Evaluate $\binom{n}{j}$ 2. Use the Binomial Theorem	

Total: 6 days

Note: Additional days reserved for review and assessment.

Things to Know		
Amount of Annuity	Arithmetic Sequence	Binomial Coefficient
Binomial Theorem	Factorials	Geometric Sequence
Infinite Geometric Series	Principle of Mathematical Induction	Sequence
Sum of a Convergent Infinite Geometric Series	Sum of the First n Terms of an Arithmetic Sequence	Sum of the First n Terms of a Geometric Sequence
The Pascal Triangle		

Standards	
HS.A-APR.C.5 (+)	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

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Conics (Chapter 10.2-10.4)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
10.2	The Parabola	1. Analyze Parabola with Vertex at the Origin 2. Analyze Parabolas with Vertex at (h, k) 3. Solve Applied Problems Involving Parabolas	1 day
10.3	The Ellipse	1. Analyze Ellipses with Center at the Origin 2. Analyze Ellipses with Center at (h, k) 3. Solve Applied Problems Involving Ellipses	1.5 days
10.4	The Hyperbola	1. Analyze Hyperbolas with Center at the Origin 2. Find the Asymptotes of a Hyperbola 3. Analyze Hyperbolas with Center at (h, k) 4. Solve Applied Problems Involving Hyperbolas	1.5 days

Total: 4 days

Note: Additional days reserved for review and assessment.

Things to Know		
Ellipse	Hyperbola	Parabola

Standards	
HS.G-GPE.A.3 (+)	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

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Trigonometric Functions (Chapter 6)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
6.1	Angles and Their Measure	1. Convert between Decimals and Degrees, Minutes, Seconds Measures for Angles 2. Find the Length of an Arc of a Circle 3. Convert from Degrees to Radians and from Radians to Degrees 4. Find the Area of a Sector of a Circle 5. Find the Linear Speed of an Object Traveling in Circular Motion	1 day
6.2	Trigonometric Functions: Unit Circle Approach	1. Find the Exact Values of the Trigonometric Functions Using a Point on the Unit Circle 2. Find the Exact Values of the Trigonometric Functions of Quadrantal Angles 3. Find the Exact Values of the Trigonometric Functions of $\frac{\pi}{4} = 45°$ 4. Find the Exact Values of the Trigonometric Functions of $\frac{\pi}{6} = 30°$ and $\frac{\pi}{3} = 60°$ 5. Find the Exact Values of the Trigonometric Functions for Integer Multiples of $\frac{\pi}{6} = 30°$, $\frac{\pi}{4} = 45°$, and $\frac{\pi}{3} = 60°$ 6. Use a Calculator to Approximate the Value of a Trigonometric Function 7. Use a Circle of Radius r to Evaluate the Trigonometric Functions	2 days

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
6.3	Properties of the Trigonometric Functions	1. Determine the Domain and Range of the Trigonometric Functions 2. Determine the Period of the Trigonometric Functions 3. Determine the Signs of the Trigonometric Functions in a Given Quadrant 4. Find the Values of the Trigonometric Functions in a Given Quadrant 5. Find the Exact Values of the Trigonometric Functions of an Angle Given One of the Functions and the Quadrant of the Angle 6. Use Even-Odd Properties to Find the Exact Values of the Trigonometric Functions	2 days
6.4	Graphs of the Sine and Cosine Functions	1. Graph Functions of the Form $y = A\sin(\omega x)$ Using Transformations 2. Graph Functions of the Form $y = A\cos(\omega x)$ Using Transformations 3. Determine the Amplitude and Period of Sinusoidal Functions 4. Graph Sinusoidal Functions Using Key Points 5. Find an Equation for a Sinusoidal Graph	1 day
6.5	Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions	1. Graph Functions of the Form $y = A\tan(\omega x) + B$ and $y = A\cot(\omega x) + B$ 2. Graph Functions of the Form $y = A\csc(\omega x) + B$ and $y = A\sec(\omega x) + B$	1 day
6.6	Phase Shift; Sinusoidal Curve Fitting	1. Graph Sinusoidal Functions of the Form $y = A\sin(\omega x - \phi) + B$ 2. Build Sinusoidal Models from Data	1 day

Total: 8 days

Note: Additional days reserved for review and assessment.

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Things to Know		
1 Counterclockwise Revolution	1 Degree	1 Radian
Angle in Standard Position	Angular Speed	Arc Length
Area of a Sector	Linear Speed	Periodic Function
Trigonometric Functions	Trigonometric Functions Using a Circle of Radius r	

Standards	
HS.F-TF.A.3 (+)	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.
HS.F-TF.A.4 (+)	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

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Analytic Trigonometry (Chapter 7)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
7.1	The Inverse Sine, Cosine, and Tangent Functions	1. Find the Exact Value of an Inverse Singe Function 2. Find an Approximate Value of an Inverse Sine Function 3. Use Properties of Inverse Functions to Find Exact Values of Certain Composite Functions 4. Find the Inverse Function of a Trigonometric Function 5. Solve Equations Involving Inverse Trigonometric Functions	0.5 day
7.2	The Inverse Trigonometric Functions (Continued)	1. Find the Exact Value of Expressions Involving the Inverse Sine, Cosine, and Tangent Functions 2. Define the Inverse Secant, Cosecant and Cotangent Functions 3. Use a Calculator to Evaluate $\sec^{-1} x$, $\csc^{-1} x$, and $\cot^{-1} x$ 4. Write a Trigonometric Expression as an Algebraic Expression	0.5 day
7.3	Trigonometric Equations	1. Solve Equations Involving a Single Trigonometric Function 2. Solve Trigonometric Equations Using a Calculator 3. Solve Trigonometric Equations Quadratic in Form 4. Solve Trigonometric Equations Using Fundamental Identities 5. Solve Trigonometric Equations Using a Graphing Utility	2 days
7.4	Trigonometric Identities	1. Use Algebra to Simplify Trigonometric Expressions 2. Establish Identities	1 day

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
7.5	Sum and Difference Formulas	1. Use Sum and Difference Formulas to Find Exact Values 2. Use Sum and Difference Formulas to Establish Identities 3. Use Sum and Difference Formulas Involving Inverse Trigonometric Functions 4. Solve Trigonometric Equations Linear in Sine and Cosine	1 day
7.6	Double-angle and Half-angle Formulas	1. Use Double-angle Formulas to Find Exact Values 2. Use Double-angle Formulas to Establish Identities 3. Use Half-angle Formulas to Find Exact Values	1 day
7.7	Product-to-Sum and Sum-to-Product Formulas	1. Express Products as Sums 2. Express Sums as Products	1 day *time permitting*

Total: 7 days

Note: Additional days reserved for review and assessment.

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Things to Know		
Definitions of the Six Inverse Trigonometric Functions	Double-angle Formulas	Half-angle Formulas
Product-to-Sum Formulas	Sum and Difference Formulas	Sum-to-Product Formulas

Standards	
HS.F-TF.A.3 (+)	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.
HS.F-TF.B.6 (+)	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
HS.F-TF.B.7 (+)	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
HS.F-TF.C.9 (+)	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

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Applications of Trig Functions (Chapter 8)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
8.1	Right Triangle Trigonometry; Applications	1. Find the Value of Trigonometric Functions of Acute Angles Using Right Triangles 2. Use the Complementary Angle Theorem 3. Solve Right Triangles 4. Solve Applied Problems	1 day
8.2	The Law of Sines	1. Solve SAA and ASA Triangles 2. Solve SSA Triangles 3. Solve Applied Problems	1 day
8.3	The Law of Cosines	1. Solve SAS Triangles 2. Solve SSS Triangles 3. Solve Applied Problems	1 day
8.4	Area of a Triangle	1. Find the Area of SAS Triangles 2. Find the Area of SSS Triangles	1 day

Total: 4 days

Note: Additional days reserved for review and assessment.

Things to Know		
Area of a Triangle	Law of Cosines	Law of Sines

Standards	
HS.G-SRT.D.9 (+)	Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
HS.G-SRT.D.10 (+)	Prove the Laws of Sines and Cosines and use them to solve problems.
HS.G-SRT.D.11 (+)	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

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Polar Coordinates (Chapter 9.1-9.3)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
9.1	Polar Coordinates	1. Plot Points Using Polar Coordinated 2. Convert from Polar Coordinates to Rectangular Coordinates 3. Convert from Rectangular Coordinates to Polar Coordinates 4. Transform Equations between Polar and Rectangular Forms	1 day
9.2	Polar Equations and Graphs	1. Identify and Graph Polar Equations by Converting to Rectangular Equations 2. Test Polar Equations for Symmetry 3. Graph Polar Equations by Plotting Points	2.5 days
9.3	The Complex Plane; DeMoivre's Theorem	1. Plot Points in the Complex Plane 2. Convert a Complex Number between Rectangular Form and Polar Form 3. Find Products and Quotients of Complex Numbers in Polar Form 4. Use DeMoivre's Theorem 5. Find Complex Roots	2 days

Total: 5.5 days

Note: Additional days reserved for review and assessment.

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Things to Know		
DeMoivre's Theorem	n^{th} Root of a Complex Number $w = r(\cos\theta_0 + i\sin\theta_0)$	Polar Form of a Complex Numbers
Relationship Between Polar Coordinates (r, θ) and Rectangular Coordinates (x, y)		

Standards	
HS.N-CN.A.3 (+)	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
HS.N-CN.B.4 (+)	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
HS.N-CN.B.5 (+)	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example, (-1 + √3 i)³ = 8 because (-1 + √3 i) has modulus 2 and argument 120°.*
HS.N-CN.B.6 (+)	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

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Vectors (Chapter 9.4-9.7)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
9.4	Vectors	1. Graph Vectors 2. Find a Position Vector 3. Add and Subtract Vectors Algebraically 4. Find a Scalar Multiple and the Magnitude of a Vector 5. Find a Unit Vector 6. Find a Vector from its Direction and Magnitude 7. Model with Vectors	1.5 days
9.5	The Dot Product	1. Find the Dot Product of Two Vectors 2. Find the Angle Between Two Vectors 3. Determine Whether Two Vectors are Parallel 4. Determine Whether Two Vectors are Orthogonal 5. Decompose a Vector into Two Orthogonal Vectors 6. Compute Work	1 day
9.6	Vectors in Space	1. Find the Distance Between Two Points in Space 2. Find Position Vectors in Space 3. Perform Operations on Vectors 4. Find the Dot Product 5. Find the Angle Between Two Vectors 6. Find the Direction Angles of a Vector	1 day
9.7	The Cross Product	1. Find the Cross Product of Two Vectors 2. Know Algebraic Properties of the Cross Product 3. Know Geometric Properties of the Cross Product 4. Find a Vector Orthogonal to Two Given Vectors 5. Find the Area of a Parallelogram	1 day

Total: 4.5 days

Note: Additional days reserved for review and assessment.

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Things to Know		
Angle θ Between Two Nonzero Vectors **u** and **v**	Area of a Parallelogram	Cross Product
Direction Angles of a Vector Space	Dot Product	Position Vector
Unit Vector		

Standards	
HS.N-CN.B.6 (+)	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
HS.N-VM.A.1 (+)	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $\|\boldsymbol{v}\|$, $\|\|\boldsymbol{v}\|\|$, v).
HS.N-VM.A.2 (+)	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
HS.N-VM.A.3 (+)	Solve problems involving velocity and other quantities that can be represented by vectors.
HS.N-VM.B.4 (+)	Add and subtract vectors.
HS.N-VM.B.4a	Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
HS.N-VM.B.4b	Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
HS.N-VMB.4c	Understand vector subtraction $\boldsymbol{v} - \boldsymbol{w}$ as $\boldsymbol{v} + (-\boldsymbol{w})$, where $-\boldsymbol{w}$ is the additive inverse of $\boldsymbol{w}$, with the same magnitude as $\boldsymbol{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
HS.N-VM.B.5 (+)	Multiply a vector by a scalar.
HS.N-VM.B.5a	Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.
HS.N-VM.B.5b	Compute the magnitude of a scalar multiple $c\boldsymbol{v}$ using $\|\|c\boldsymbol{v}\|\| = \|c\|\boldsymbol{v}$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\|c\|\boldsymbol{v} \neq 0$, the direction of $c\boldsymbol{v}$ is either along $\boldsymbol{v}$ (for $c > 0$) or against $\boldsymbol{v}$ (for $c < 0$).

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Review Chapter 10 (Chapter 10.5-10.6)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
10.5	Rotation of Axes; General Form of a Conic	1. Identify a Conic 2. Use a Rotation of Axes to Transform Equations 3. Analyze an Equation Using a Rotation of Axes 4. Identify Conics without a Rotation of Axes	2 days *teacher discretion*
10.6	Polar Equations of Conics	1. Analyze and Graph Polar Equations of Conics 2. Convert the Polar Equation of a Conic to a Rectangular Equation	2 days *teacher discretion*

Total: 4 days

Note: Additional days reserved for review and assessment.

Things to Know		
Angle θ of Rotation That Eliminates the $x'y'$-term	Conic in Polar Coordinates	General Equation of a Conic
Polar Equations of a Conic with Focus at the Pole	Rotation Formulas	

Standards