College Trigonometry & Analytic Geometry
Poudre School District
Pacing Overview

Section	Title	Pacing	Notes
Semester 1			
Analytic Geometry/Conics (Chapters 10.1-10.4 & 11.6) 13.5 days			
Chapter 10.1-10.4: Analytic Geometry			
10.1	Conics	2 days	
10.2	The Parabola	2 days	
10.3	The Ellipse	2 days	
10.4	The Hyperbola	2.5 days	
Chapter 11.6: Systems of Equations and Inequalities			
11.6	Systems of Nonlinear Equations	1.5 days	
Trigonometric Functions (Chapter 6) 13.5 days			
6.1	Angles and Their Measure	2 days	
6.2	Trigonometric Functions: Unit Circle Approach	1.5 days	
6.3	Properties of the Trigonometric Functions	2 days	
6.4	Graphs of the Sine and Cosine Functions	1.5 days	
6.5	Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions	1.5 days	
6.6	Phase Shift; Sinusoidal Curve Fitting	1.5 days	
Analytic Trigonometry (Chapter 7.1-7.3) 5 days			
7.1	The Inverse Sine, Cosine, and Tangent Functions	1.5 days	
7.2	The Inverse Trigonometric Functions (continued)	1 day	
7.3	Trigonometric Equations	1.5 days	

College Trigonometry & Analytic Geometry
Poudre School District
Pacing Overview

Section	Title	Pacing	Notes
Semester 2			
Analytic Trigonometry Continued (Chapter 7.4-7.7) 8 days			
7.1-7.3	Review	0.5 day	
7.4	Polynomials	2 days	
7.5	Sum and Difference Formulas	1.5 days	
7.6	Double-angle and Half-angle Formulas	1 day	
7.7	Product-to-Sum and Sum-to-Product Formulas	1 day	*optional*
Applications of Trig Functions (Chapter 8) 7 days			
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	0.5 day	
8.5	Simple Harmonic Motion Damped Motion; Combining Waves	1 day	
Polar Coordinates (Chapter 9) 17 days			
9.1	Polar Coordinates	1 day	
9.2	Polar Equations and Graphs	3.5 days	
9.3	The Complex Plane; DeMoivre's Theorem	2.5 days	
9.4	Vectors	2 days	
9.5	The Dot Product	1 day	
9.6	Vectors in Space	1 day	
9.7	The Cross Product	1 day	
Sequences and Series (Chapter 12) 8 days			
12.1	Sequences	1 day	
12.2	Arithmetic Sequences	1.5 days	
12.3	Geometric Sequences; Geometric Series	1.5 days	
12.4	Mathematical Induction	1 day	*if time allows*
12.5	The Binomial Theorem	1 day	*If time allows*

Note: The schedule above is for the course and should be completed prior to seniors' last day. The sections below are reserve for instruction, time permitting.

A Preview of Calculus: The Limit, Derivative, and Integral of a Function (Chapter 14) 3 days			
14.1	Finding Limits Using Tables and Graphs	1 day	*if time allows*
14.2	Algebra Techniques for Finding Limits	1 day	*if time allows*
14.3	One-Sided Limits; Continuous Functions	1 day	*if time allows*
Analytic Geometry (Chapter 10.5-10.7) 6 days			
10.5	Rotation of Axes; General Form of a Conic	2 days	*if time allows*
10.6	Polar Equations of Conics	2 days	*if time allows*
10.7	Plane Curves and Parametric Equations	2 days	*if time allows*

Analytic Geometry/Conics (Chapters 10.1-10.4 & 11.6)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
Chapter 10: Analytic Geometry			
10.1	Conics	1. Know the Names of the Conics	2 days
10.2	The Parabola	1. Analyze Parabolas with Vertex at the Origin 2. Analyze Parabolas with Vertex at *(h, k)* 3. Solve Applied Problems Involving Parabolas	2 days
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	2 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	2.5 days
Chapter 11: Systems of Equations and Inequalities			
11.6	Systems of Nonlinear Equations	1. Solve a System of Nonlinear Equations Using Substitution 2. Solve a System of Nonlinear Equations Using Elimination	1.5 days
			Total: 13.5 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.

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	2 days
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	1.5 days

continued on next page

Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
6.3	Properties of the Trigonometric Functions	1. Determine the Domain and the 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 Using Fundamental Identities 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	1.5 days
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 $y = A\sec(\omega x) + B$	1.5 days
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	1.5 days

Total: 13.5 days

Note: Additional days reserved for review and assessment.

Things to Know		
1 Counterclockwise Revolution	1 Degree (1°)	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.

Analytic Trigonometry (Chapter 7.1-7.3)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
7.1	The Inverse Sine, Cosine, and Tangent Functions	1. Find the Exact Value of an Inverse Sine 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	1.5 days
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	1 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	1.5 days

Total: 5 days

Note: Additional days reserved for review and assessment.

Things to Know
Definition of the Six Inverse Trigonometric Functions

Standards	
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.

Analytic Trigonometry Continued (Chapter 7.4-7.7)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
7.1-7.3	Review		0.5 day
7.4	Polynomials	1. Use Algebra to Simplify Trigonometric Expressions 2. Establish Identities	2 days
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	1.5 days
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 *(optional)*	1. Express Products as Sums 2. Express Sums as Products	1 day
			Total: 8 days

Note: Additional days reserved for review and assessment.

Things to Know		
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.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.

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 or 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	0.5 day
8.5	Simple Harmonic Motion; Damped Motion; Combining Waves	3. Build a Model for an Object in Simple Harmonic Motion 4. Analyze Simple Harmonic Motion 5. Analyze an Object in Damped Motion 6. Graph the Sum of Two Functions	1 day

Total: 7 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).

Polar Coordinates (Chapter 9)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
9.1	Polar Coordinates	1. Plot Points Using Polar Coordinates 2. Convert from Polar Coordinates to Rectangular Coordinated 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 o Rectangular Equations 2. Test Polar Equations for Symmetry 3. Graph Polar Equations by Plotting Points	3.5 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	2.5 days
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	2 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

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Chapter Summary (continued)			
Section	**Title**	**Learning Objectives**	**Pacing**
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: 17 days

Note: Additional days reserved for review and assessment.

College Trigonometry & Analytic Geometry

Poudre School District

Things to Know		
Angle θ Between Two NonZero Vectors **u** and **v**	Area of a Parallelogram	Cross Product
DeMoivre's Theorem	Direction Angles of a Vector in Space	Dot Product
n^{th} Root of a Complex Number $w = r(\cos\theta_0 + i\sin\theta_0)$	Polar Form of a Complex Number	Position Vector
Relationship Between Polar Coordinates (r, θ) and Rectangular Coordinates (x, y)	Unit Vector	

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,* $(-1 + \sqrt{3}\,i)^3 = 8$ *because* $(-1 + \sqrt{3}\,i)$ *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.
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., $\boldsymbol{v}$, $\lvert\boldsymbol{v}\rvert$, $\lvert\lvert\boldsymbol{v}\rvert\rvert$, 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.

Standards (continued)	
HS.N-VM.B.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 $c < 0$).
HS.N-VM.C.12 (+)	Work with 2 × 2 matrices as a transformations of the plane, and interpret the absolute value of the determinant in terms of area.

Sequences and Series (Chapter 12)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
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	1.5 days
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	1.5 days
12.4	Mathematical Induction *(if time allows)*	1. Prove Statements Using Mathematical Induction	1 day
12.5	The Binomial Theorem *(if time allows)*	1. Evaluate $\binom{n}{j}$ 2. Use the Binomial Theorem	1 day

Total: 8 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.

A Preview of Calculus: The Limit, Derivative, and Integral of a Function (Chapter 14)
(time permitting)

Chapter Summary			
Section	**Title**	**Learning Objectives**	**Pacing**
14.1	Finding Limits Using Tables and Graphs	1. Find the Limit Using a Table 2. Find the Limit Using a Graph	1 day
14.2	Algebra Techniques for Finding Limits	1. Find the Limit of a Sum, a Difference, and a Product 2. Find the Limit of a Polynomial 3. Find the Limit of a Power or a Root 4. Find the Limit of a Quotient 5. Find the Limit of an Average Rate of Change	1 day
14.3	One-Sided Limits; Continuous Functions	1. Find the One-sided Limits of a Function 2. Determine Whether a Function is Continuous	1 day
			Total: 3 days

Note: Additional days reserved for review and assessment.

Things to Know		
Continuous Function	Limit	Limit Formulas
Limit of a Polynomial	Limit Properties	

Standards

College Trigonometry & Analytic Geometry
Poudre School District

Analytic Geometry (Chapter 10.5-10.7)
(time permitting)

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 Axis	2 days
10.6	Polar Equations of Conics	5. Analyze and Graph Polar Equations of Conics 6. Convert the Polar Equation of a Conic to a Rectangular Equation	2 days
10.7	Plane Curves and Parametric Equations	7. Graph Parametric Equations 8. Find a Rectangular Equation for a Curve Defined Parametrically 9. Use Time as a Parameter in Parametric Equations 10. Find Parametric Equations for Curves Defines by Rectangular Equations	2 days
			Total: 6 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
Parametric Equations of a Curve	Polar Equations of a Conic with Focus at the Pole	Rotation Formulas

Standards