

Algebra III/Trig		
Unit	Priority Standards	Supporting Standards
1 - Functions	CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.	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.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
2 - Rationals	CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.	CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials. CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. CC.2.2.HS.D.5 Use polynomial identities to solve problems. CC.2.2.HS.D.7 Create and graph equations and inequalities to describe numbers or relationships. CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
3 - Exponentials & Logarithms	CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.	CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.2.HS.D.7 Create and graph equations and inequalities to describe numbers or relationships. CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable. 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.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
4 - Trigonometric Functions	CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions. CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs. CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.	CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. 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.3 Write functions or sequences that model relationships between two quantities.

		CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.	
		CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.	
		CC.2.3.HS.A.7 Apply trigonometric ratios to solve problems involving right triangles.	
5 - Trigonometric Identities & Applications	CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.	CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.	
	CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.	CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.	
	CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.	CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.	
		CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.	
	CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.		

CVSD Mathematics Curriculum Map ~ Algebra III/Trigonometry

CV Priority Standard/PA Core Standard	
CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.	
Taught in Unit(s)	
Unit 1 - Functions	
Explanation/Example of Standard	
Analyze graphs and their translations on the coordinate plane. Identify domain, range & other properties of functions & their graphs.	
Common Misconceptions	
Students switch the domain and range of the function. When evaluating composition of functions, students will multiply instead of substituting one function's range into another's domain. When solving for an inverse function, students will improperly apply the order of operations. When shifting graphs, students will move the opposite direction.	
Big Idea(s)	Essential Question(s)
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.	How do you explain the benefits of multiple methods of representing polynomial functions (tables, graphs, equations, and contextual situations)? How do quadratic equations and their graphs and/or tables help us interpret events that occur in the world around us? How are relationships represented mathematically? How can data be organized and represented to provide insight into the relationship between quantities?
Assessments	
See unit map for specific unit common assessments.	
Concepts (what students need to know)	Skills (what students must be able to do)
Function vs. Relations Function notation Domain and Range Transformations of functions Inverses Vertical line test Relative maximum and minimum Piecewise functions Compositions of functions Even vs. Odd Functions	Identify relations that are functions. Evaluate functions. Identify domain and range of functions. Identify increasing and decreasing intervals. Determine relative maximums and minimums. Graph piecewise functions. Apply rigid and nonrigid transformations to graphs. Determine and evaluate composition of functions. Determine the inverse of a function.

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CV Priority Standard/PA Core Standard	
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.	
Taught in Unit(s)	
Unit 3 - Rationals	
Explanation/Example of Standard	
Simplify rational expressions. Solve rational equations. Graph rational functions.	
Common Misconceptions	
When students simplify a rational expression, they will cancel individual terms instead of entire factors. When adding and subtracting rational expressions, students will simplify without finding a common denominator. Students will not factor a rational expression before simplifying. Students think that rational expression rules are different when variables are involved. Students switch horizontal and vertical asymptotes and x & y intercepts.	
Big Idea(s)	Essential Question(s)
Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. ❖ Patterns exhibit relationships that can be extended, described, and generalized.	How are relationships represented mathematically? How is mathematics used to quantify, compare, represent, and model numbers? How is mathematics used to quantify, compare, represent, and model numbers? How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
Assessments	
See unit map for specific unit common assessments.	
Concepts (what students need to know)	Skills (what students must be able to do)
Rules of Exponents Properties of Radicals Operations with Polynomials (binomial, trinomial, etc.) Operations with Rational Expressions Complex Fractions Graphs of Rational Functions Vertical & Horizontal Asymptotes Domain of Rational Functions Range of Rational Functions	Simplify rational expressions. Simplify radical expressions. Rationalize numerators and denominators. Perform operations with polynomials. Factor polynomials. Identify domain of algebraic expressions. Analyze graphs of rational functions Sketch graphs of rational functions.

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CV Priority Standard/PA Core Standard	
CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.	
Taught in Unit(s)	
Unit 2 - Exponential and Logarithmic Functions	
Explanation/Example of Standard	
<p>Solve exponential and logarithmic equations. Analyze exponential and logarithmic graphs. Solve real - world problems using exponential and logarithmic models.</p>	
Common Misconceptions	
<p>Students wrongly manipulate exponential and logarithmic equations. Students misunderstand the domains of exponential and logarithmic graphs. Students misuse logarithmic properties when simplifying logarithmic expressions. Students forget to check for extraneous solutions when solving logarithmic equations.</p>	
Big Idea(s)	Essential Question(s)
<p>Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. Patterns exhibit relationships that can be extended, described, and generalized.</p> <ul style="list-style-type: none"> ❖ Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations. ❖ There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. ❖ 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. ❖ Mathematical relationships among numbers can be represented, compared, and communicated. ❖ Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. ❖ Patterns exhibit relationships that can be extended, described, and generalized. ❖ Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. 	<p>How can you extend algebraic properties and processes to quadratic, exponential and polynomial expressions and equations and then apply them to solve real world problems? What are the advantages/disadvantages of the various methods to represent exponential functions (table, graph, equation) and how do we choose the most appropriate representation? How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How are relationships represented mathematically? How is mathematics used to quantify, compare, represent, and model numbers? How can patterns be used to describe relationships in mathematical situations?</p>
Assessments	
See unit map for specific unit common assessments.	

Concepts (what students need to know)	Skills (what students must be able to do)
Exponential Function Natural Exponential Function Logarithmic Function Common Logarithmic Function Natural Logarithmic Function Properties of Logarithms Exponential & Logarithmic Equations Exponential & Logarithmic Models Exponential growth and decay functions	Evaluate exponential and logarithmic functions. Solve exponential and logarithmic equations. Condense and expand logarithmic expressions. Model and solve real - life applications using exponential and logarithmic functions.

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CV Priority Standard/PA Core Standard	
CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.	
Taught in Unit(s)	
Unit 4 - Trigonometric Functions	
Explanation/Example of Standard	
Determine exact values of all six trigonometric ratios for the special angles. Know all 16 special angles (in radians and degrees) and the coordinates of each on the unit circle.	
Common Misconceptions	
Students will switch sine and cosine and how they relate to the coordinates. Students will multiply by the wrong ratio when converting from radians to degrees and vice versa. Students will not pay attention to the quadrant in which the angle lies.	
Big Idea(s)	Essential Question(s)
<p>Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.</p> <p>Some geometric relationships can be described and explored as functional relationships.</p> <p>Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.</p> <p>Patterns exhibit relationships that can be extended, described, and generalized.</p>	<p>How can you use coordinates and algebraic techniques to represent, interpret, and verify trigonometric relationships?</p> <p>How can patterns be used to describe relationships in mathematical situations?</p> <p>How can recognizing repetition or regularity assist in solving problems more efficiently?</p> <p>How can trigonometric properties and theorems be used to describe, model, and analyze situations?</p>
Assessments	
See unit map for specific unit common assessments.	
Concepts (what students need to know)	Skills (what students must be able to do)
Trigonometry Sine, Cosine, Tangent Cosecant, Secant, Cotangent Initial Side Terminal Side Standard Position Coterminal Angle Reference Angle Radian Angle Degree Angle Positive and Negative Angle Unit Circle	Identify all six trigonometric functions of an angle. Convert between radians and degrees. Identify the reference angle and any coterminal angle for the given angle. Draw an angle in standard position.

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CV Priority Standard/PA Core Standard	
CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.	
Taught in Unit(s)	
Unit 4 - Trigonometric Functions, Unit 5 - Trigonometric Identities and Applications	
Explanation/Example of Standard	
Graph sine and cosine functions. Identify the parameters of the graphs.	
Common Misconceptions	
Students misunderstand the graphs of sine and cosine and where they begin. Students confuse the period with the angular frequency. When determining the translations from a trigonometric equation, students switch the direction of the translations. When dealing with inverse sine and cosine, students confuse the domain restriction that allow for an inverse function.	
Big Idea(s)	Essential Question(s)
<p>Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.</p> <p>Some trigonometric relationships can be described and explored as functional relationships.</p> <p>Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.</p> <p>Graphs can be transformed in an infinite number of ways. Transformations can be described and analyzed mathematically.</p>	<p>How can you use coordinates and algebraic techniques to represent, interpret, and verify trigonometric relationships?</p> <p>How can patterns be used to describe relationships in mathematical situations?</p> <p>How can recognizing repetition or regularity assist in solving problems more efficiently?</p> <p>How can trigonometric properties and theorems be used to describe, model, and analyze situations?</p>
Assessments	
See unit map for specific unit common assessments.	
Concepts (what students need to know)	Skills (what students must be able to do)
<p>Amplitude</p> <p>Period</p> <p>Translations</p> <p>Transformations</p> <p>Inverse Sine</p> <p>Inverse Cosine</p> <p>Angular Frequency</p>	<p>Identify amplitude, period, phase shift and vertical shift of a trigonometric equation and graph.</p> <p>Sketch translations of sine and cosine graphs.</p> <p>Model real - life data using sine and cosine functions.</p> <p>Solve trigonometric equations using inverse sine and cosine.</p>

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CV Priority Standard/PA Core Standard	
CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.	
Taught in Unit(s)	
Unit 4 - Trigonometric Functions, Unit 5 - Trigonometric Identities and Applications	
Explanation/Example of Standard	
<p>Using the pythagorean identity to find trigonometric values. Verify trigonometric identities. Finding the values of the six trigonometric functions using right triangles.</p>	
Common Misconceptions	
<p>When verifying identities, students will manipulate both sides of the equation. Students find incorrect ratios of sine, cosine and tangent. Students make fundamental algebra mistakes when using the pythagorean identity to find trigonometric values. Students confuse cosecant and secant and which one is the reciprocal function for sine and cosine.</p>	
Big Idea(s)	Essential Question(s)
<p>Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. Mathematical statements can be justified through deductive and inductive reasoning and proof.</p>	<p>How do you use the ideas of direct and indirect proof, and counter-examples to verify valid conjectures and refute invalid conjectures? How can you use coordinates and algebraic techniques to represent, interpret, and verify trigonometric relationships? How can patterns be used to describe relationships in mathematical situations? How can trigonometric properties and theorems be used to describe, model, and analyze situations?</p>
Assessments	
See unit map for specific unit common assessments.	
Concepts (what students need to know)	Skills (what students must be able to do)
<p>Sine, Cosine, Tangent Reciprocal Identities Cosecant, Secant, Cotangent Pythagorean Identities Quotient Identities Right Triangle Trigonometry Sum and Difference Angle Identities</p>	<p>Evaluate trigonometric functions using trigonometric identities or right triangles. Verify trigonometric identities. Simplify trigonometric expressions.</p>