



BLUE VALLEY DISTRICT CURRICULUM & INSTRUCTION

Mathematics | Advanced Algebra



Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
5 weeks	Prerequisite Skill Review: Real Numbers Exponents Radicals Rationals Distance Midpoint	Ch P	<ul style="list-style-type: none">• Operations with Rational and Irrational Numbers• Equivalent Expressions• Rational Exponents• Radical Notation• Rational Expressions• Perimeter, Area, Distance Formula• Coordinate Graphing• Midpoint Formula	<ul style="list-style-type: none">• Find the sum and product of two rational numbers, two irrational numbers, and one rational and one irrational number.• Explain the results of those operations and categorize the results in the real number system.• Recognize equivalent expressions• Explain the relationship between rational exponents and radical notation.• Convert from exponential form to radical form and vice versa• Perform operations using rational exponents• Add rational expressions• Subtract rational expressions• Multiply rational expressions• Divide rational expressions• Computing perimeters using the distance formula• Computing areas using the distance formula• Understand relationships between (x,y) as a solution to an equation

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
5 weeks	Circles, Quadratics, Solving, Complex, Inequalities	Ch 1	<ul style="list-style-type: none"> • Single Variable Equations Single Variable Inequalities • Factoring Completing the Square • Rational and Radical Equations • Complex Numbers • Properties of Complex numbers Operations with complex numbers • Conjugates of Complex Numbers • Solve quadratic equations Complex solutions • Quadratic Equations Complex Numbers • Equation of a Circle • Solving Quadratic and Rational Inequalities 	<ul style="list-style-type: none"> • Create and Solve equations and inequalities <ul style="list-style-type: none"> o Quadratic o Simple Rational o Exponential • Factoring to find zeros • Completing the square to find zeros • Completing the square to find extreme values • Applying knowledge of zeros and extremes to real work situations • Solve rational equations • Solve radical equations • Find & eliminate extraneous solutions • Understand definition of a complex number • Identify parts of a complex number • Add complex numbers • Subtract complex numbers • Multiply complex numbers • Find the conjugate of a complex number • Find the quotient of a complex number • Find the modulus of a complex number • Quadratic Formula • Completing the Square • Simplifying radicals with “i” • Identifying conjugate pairs • Solve using completing the square. • Derive Quadratic Formula • Write in standard form

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
4 weeks	Functions & Function graphs	Chapter 2	<ul style="list-style-type: none"> • Domain and Range of Inverse Functions • Graphs of functions • Transformations • Transform quadratic expressions • Key Features of the graph of a function • Composition of Functions • Inverse Functions • Verifying Inverses by Compositions 	<ul style="list-style-type: none"> • Produce an invertible function from a non-invertible function by restricting the domain • Graphing functions by hand • Graphing functions using technology • Perform transformations on a function • Recognize transformations done to a given function • Determine if a function is even or odd • Factoring quadratics to reveal zeros • Changing from standard form to vertex form using completing the square • Finding zeros • Interpreting Max / Min based on vertex form • Interpreting key factors of graphs of functions (see standard for key features) • Interpreting key factors of graphs of functions (see standard for key features) • Identifying end behavior • Factoring quadratics to reveal zeros • Changing from standard form to vertex form using completing the square • Compose functions • Finding the inverse of a function • Verify, by composition, that a function is an inverse of another function • Reading inverse values from a table or a graph

Weeks	ORGANIZING THEME/TOPIC	CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS
4 weeks	Polynomials	Ch 3	<ul style="list-style-type: none"> • Key Features of the graph of a function • Zeros of Polynomials • Graphing Polynomials • Factoring • Completing the Square • Roots of polynomial functions • Zero Product Property • Imaginary Root Theorem • Graphs of Polynomial Functions • Remainder Theorem • Polynomial Division • Solve polynomial functions Identify complex root	<ul style="list-style-type: none"> • Interpreting key factors of graphs of functions (see standard for key features) • Identify zeros of polynomials using factorization • Rough graph a polynomial using zeros • Factor Polynomials • Factoring to find zeros • Completing the square to find zeros • Completing the square to find extreme values • Applying knowledge of zeros and extremes to real work situations • Quadratic formula • Factoring - all types • Identifying conjugate pairs
1 week	Rational functions & their graphs	Ch 4	Graphs of Rational Functions	<ul style="list-style-type: none"> • Graph functions by hand • Graph functions using technology • Identifying asymptotes • Identifying end behavior
2.5 weeks	Exponential & logarithmic functions	Ch 5	Graphs of Exponential functions Graphs of Logarithmic functions Exponents and Logarithms as Inverses Exponents and Logarithms Linear Functions vs. Exponential Functions Exponential Functions Exponential Growth/Decay Properties of Logarithms	<ul style="list-style-type: none"> • Graph functions by hand • Graph functions using technology • Identifying key features • Identifying period, midline & amplitude • Solving problems involving logarithms and exponents • Converting an exponential equation to its logarithmic equivalent • Identify if a function is linear or exponential • Identify if a real life application is linear or exponential • Identify if a function is linear or exponential • Identify exponential growth or decay • Interpreting expressions for exponential functions • Understanding rapid growth rate of an exponential function • Construct linear or exponential function given a table, graph or description

Weeks	ORGANIZING THEME/TOPIC CHAPTER	CONTENT	FOCUS STANDARDS & SKILLS	
2.5 weeks	Solving logarithmic & exponential equations	Ch 5	<ul style="list-style-type: none"> • Solutions of Equations (I.e. $f(x)=g(x)$) • Systems of Equations with Linear and/or Quadratic Equations • Linear Inequalities 	<ul style="list-style-type: none"> • Solve an exponential or logarithmic equation <ul style="list-style-type: none"> o Using graphs o Using tables • Explain the relationship between the algebraic solution, graphical intersections, and numeric intersection. • Solve Systems of Equations (multivariable systems) <ul style="list-style-type: none"> o Algebraically o Graphically • Graphing Two Variable Inequalities • Graph a System of Inequalities • Graph the solution
3 weeks	Systems of Equations & Inequalities	Ch 6		
2 weeks	Matrices	Ch 7	<p>Matrix Representation of a System Systems of Equations Matrix Identities for Addition and Multiplication of Matrices Transform Vectors Scalar Multiplication on a Vector Sum, Difference, and Product of Matrices Matrix Product</p>	<ul style="list-style-type: none"> • Write a matrix equation for a system of equations • Solve the System using matrices • Find the inverse of a Matrix • Adding and multiplying matrices of appropriate dimension. Recognizing identity matrices. • Matrix multiplication • Recognizing vectors as matrices • Multiply matrices by a scalar • Students will be able to perform Addition, Subtraction, and Multiplication of Matrices of appropriate dimensions. • Students will be able to demonstrate given Matrix A, B, and C of $n \times n$ dimensions, that while both the Associative and Distributive properties of Multiplication hold true, the Commutative Property of Multiplication does not. (i.e. AB does not equal BA)

Weeks	ORGANIZING THEME/TOPIC		CONTENT	FOCUS STANDARDS & SKILLS
.5 week on Binomial Thm 2 week sequence & series (as time permits)	Sequences, Series, & Binomial Thm	Ch 8	<ul style="list-style-type: none"> • Binomial Theorem • Arithmetic Sequences • Geometric Sequences • Series and Sequence Introduction 	<ul style="list-style-type: none"> • Expand • Create Pascal's Triangle • Combinatorial Patterns • Write a recursive or explicit formula for an arithmetic sequence • Write a recursive or explicit formula for a geometric sequence • Derive the formula for the sum of a finite series • Apply the formula for the sum of a finite series.
3 weeks + ? (buildings may collectively decide to move trig ahead of sequences and series if time is critical)	Trigonometry	Trig Supplement	<ul style="list-style-type: none"> • Further Development of the Unit Circle • Symmetry • Periodicity • Simple Trig Identities • Law of Sines and Law of Cosines • Applications with the Law of Sines and the Law of Cosines • Modeling with Trigonometric Functions • Restricting the domain to create an Inverse of a Trigonometric Function • Solve Trigonometric equations using the inverse function • Sum and Difference Identities for Sine, Cosine, and Tangent • Area of a Triangle 	<ul style="list-style-type: none"> • Attaching coordinates to angles in the unit circle • Finding trigonometric values • Identifying coordinate points associated with given radian measures • Explain symmetry using the unit circle • Explain periodicity using the unit circle • $\sin^2 + \cos^2 = 1$ • $\tan = (\sin/\cos)$ • Sec, Csc, Cot • Prove the Law of Sines • Prove the Law of Cosines • Solving Oblique Triangles • Apply the Law of Sines and the Law of Cosines to solve any triangle • Identify appropriate graphs given characteristics of the graph • Identifying the domain where a function is invertible • Utilize technology to solve trigonometric equations • Interpret answers to trigonometric equations in the context of the problem • Prove sum and difference identities for sine, cosine and tangent • Use sum and difference identities to solve problems • Derive the formula: $A = 0.5ab\sin C$

