College Algebra Syllabus

Unit 0 (Prerequisites)

Topic	Objectives

Expressions and Equations	• Simplify Algebraic Expressions.
	  - Combining like terms
	  - Distribution
	• Evaluate Algebraic Expressions.
	  - Using the order of operations
	  - By substituting in values
	• Recognize the difference between expressions and equations and choose appropriate strategies for simplifying vs. solving.

Exponent Properties	• Recall and apply exponent properties to simplify expressions.
Factoring	• Factor out GCFs • Factor by grouping • Factor using the ac method • Factor differences of squares

Solving Equations	• Solving linear equations.
	• Categorize identities, conditional equations, and inconsistent equations.
	• Solving quadratic equations
	  - Using factoring and the zero product property
	  - Using the square root property
	  - Using the quadratic formula
	• Choose appropriate solving strategy based on type and structure of equation.

Rational Expressions	• Simplify, multiply, divide, add, and subtract rational expressions.

Unit 1: Functions

Topic	Objectives
Functions	From tables, graphs, and formulas, • Identify functions and one-to-one functions • Use function notation to evaluate functions and solve equations. - Substituting in numbers and expressions
Domain and Range	• Express inequalities in inequality form, on number lines, and in interval notation. • From tables, graphs, and formulas, describe domains and ranges of functions. • Evaluate piecewise functions
Other Features of functions	From tables, graphs, and formulas, describe • Horizontal and vertical intercepts • Symmetry (even and odd functions) • Solve inequalities From graphs, describe end behavior

Rates of Change	• Calculate average rates of change • Evaluate the difference quotient • Identify intervals on which a function increases, decreases, or remains constant from a graph. • Identify local maxima and minima from a graph • Identify concavity given an interval and a graph.
Function Compositions	• Compose two functions given as tables, graphs, or formulas. • Decompose functions into two nontrivial functions
Function Inverses	• Describe inverses of functions given as - graphs - tables - formulas (linear)
Transformations	• Use transformations to describe and graph functions by hand. • Given a formula, describe how transformations will modify a parent (toolkit) function.

Unit 2: Linear and Polynomial Functions

Throughout Unit 2, practice describing features of functions (domain, range, increasing/decreasing, concavity, end behavior, intercepts, symmetry)

Topic	Objectives
Linear Functions	• Calculate a line's slope from a pair of points • Write and graph the point-slope form of the equation of a line • Write and graph the slope-intercept form of the equation of a line • Find slopes and equations of parallel and perpendicular lines • Interpret slope as rate of change • Use linear functions to solve real-world problems • Solve linear inequalities
Absolute Value Functions	• Graph using transformation techniques and describe features. • Solve absolute value equations. • Solve absolute value inequalities.
Completing the Square	• Use the strategy of completing the square to rewrite a quadratic expression in the form $(x+n)^2-m$ or $a(x+n)^2-m$.
Power and Polynomial Functions	• Graph quadratic and cubic functions using transformation techniques and describe features. • Identify leading coefficients and degrees of polynomial functions • Describe the end behavior of polynomials from the algebraic formula
Quadratic Functions	• Use completing the square to write quadratics in vertex form. • Use the formula for the vertex to find a vertex and write in vertex form. • From an equation, find the vertex, intercepts, max/min, direction of opening, and concavity of a parabola. • Solve quadratic inequalities. • Use this information to solve real world problems.

Graphs of Polynomial Functions	• From both factored form, and from easily factored forms, find zeros and their multiplicity, and describe the behavior of the graph. • Sketch graphs using end behavior, and zeros and multiplicities. • Solve polynomial inequalities.

Unit 3: Inverse and Exponential and Logarithmic Functions

Throughout Unit 3, practice describing features of functions (domain, range, increasing/decreasing, concavity, end behavior, intercepts, symmetry)

Topic	Objectives
Root Functions	• Graph using transformations and describe their features. • Solve radical equations. • Find domains of radical functions from formulas.
Exponential Functions	• Write equations of exponential functions from information about rate of growth/decay. • Graph exponential functions using transformation techniques and describe their features. • Definition of e. • Use compound interest formulas.

Logarithmic Functions	• Change from logarithmic to exponential form and vice versa
	• Evaluate logarithms (without calculators)
	• Use basic logarithmic properties
	  - Inverse
	  - Exponent
	  - Change of base
	• Graph logarithmic functions using transformation techniques and describe their features
	• Identify domain of logarithms
	• Natural and common logarithms and their properties
	• Solve basic logarithm and exponential equations using inverse properties

Properties of Logarithms	• Product • Quotient • Power • Expand logarithmic expressions • Condense logarithmic expressions • Solve equations using properties of logarithms
Exponential Models	• Population Growth • Continuously compounding interest • Radioactive Decay • Doubling time/half life

Unit 4: End of Term Goodies

Dividing Polynomials	• Use long division to divide polynomials • Use division and the factor theorem to fully factor and find all roots of a polynomial. • Use division to find all zeros and sketch graphs of polynomials.
Rational Functions	• Vertical asymptotes • Horizontal asymptotes • Slant asymptotes • Sketching rational functions • Solving rational equations and inequalities
Distance, Midpoints, and Circles	• Find the distance between two points • Find the midpoint of a line segment • Write the standard form of a circle's equation. • Give the center and radius of a circle from standard form. • Convert general form to standard form.
Systems of Linear Equations	• Consistent, inconsistent, dependent • Substitution method. • Addition (elimination) method • Solve real-world problems