

Level IV - Academic Mathematics	
Unit 1 Linear Equations and Inequalities	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve linear equations with applications • Identify sets, interval notation, intersections, unions, and solve inequalities • Solve absolute value equations and inequalities
	<p>The student will solve linear equations with applications.</p> <ul style="list-style-type: none"> • Determine whether a given number is a solution for an equation • Solve linear equations using the addition and multiplication property • Solve linear equations using both additions and multiplication property with removal of parentheses where appropriate • Evaluate a formula (literal equation) and use it to solve an applied problem • Translate a word problem into a linear equation and solve
	<p>The student will identify sets, interval notation, intersection, union and solve inequalities.</p> <ul style="list-style-type: none"> • Determine if a given number is a solution to an inequality. • Graph an inequality and write an interval notation for a solution for a solution set. • Solve applied problems by translating to inequalities. • Determine the intersection of two sets, graph and solve conjunctions of inequalities. • Solve applied problems involving conjunctions and disjunctions of inequalities.
	<p>The student will solve absolute values equations and inequalities.</p> <ul style="list-style-type: none"> • Evaluate and simplify absolute value expressions. • Determine on a number line the

	<p>distance between two points.</p> <ul style="list-style-type: none"> • Solve absolute value equations. • Solve inequalities with absolute value expressions.
<p>Unit 2 Graphs, Models, and Applications</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Graph linear equations • Find the slope of an equation • Find equations of a line and a mathematical model from a linear equation
	<p>The student will graph linear equations.</p> <ul style="list-style-type: none"> • Plot points from an ordered pair • Determine whether an ordered pair of numbers is a solution of an equation • Graph linear and nonlinear equations using tables • From the equation $y = mx + b$, determine the y-intercept • Determine the slope of a line given two points and derive the equivalent slope-intercept equation. • Solve applied problems involving slope. • Graph linear equation of the type $x = s$ and $y = t$. • Graph linear equation using x and y intercepts only. • Determine if lines are parallel or perpendicular given the equations of two lines.
	<p>The student will find the equation of a line and a mathematical model from a linear equation.</p> <ul style="list-style-type: none"> • Determine the equation of a line when the slope and the y-intercept are given. • Find the equation of a line when the slope and a point are given. • Find the equation of a line when the two points are given. • Given a line and a point not on the given line, find an equation of the line parallel to the line and containing the point, and find an equation of the line perpendicular to the line containing the

	<p>points.</p> <ul style="list-style-type: none"> • Draw a representative graph of a linear equation and make predictions from the graph using a set of data. • Find a linear equation using two points from a set of data and be able to make predictions from the equation.
<p>Unit 3 Systems of Linear Equations</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve a system of linear equations in two variables with practical application. • Solve a system of linear equations in three variables with practical application. • Solve system of linear inequalities in two variables with business and/or economic applications. • Solve a system of equations using matrices, determinants and / or Cramer's Rule.
	<p>The student will solve a system of linear equation in two variables with practical applications.</p> <ul style="list-style-type: none"> • Solve a system of two linear equations by graphing and determine whether a system is inconsistent or consistent and if it is independent or dependent. • Use the substitution method to solve a system of linear equations in two variables. • Use the elimination method to solve a system of linear equation in two variables. • Solve applied problems by solving system of two equations using substitution or elimination methods. • Solve applied problems involving total value and mixture problems using system of two equations. • Solve motion problems using the system of two equations.
	<p>The student will solve a system of linear equations in three variables with practical applications.</p> <ul style="list-style-type: none"> • Recognize a linear variable in three

	<p>variables</p> <ul style="list-style-type: none"> • Solve a system of three equations in three variables by elimination • Solve applied problems using system of three equations
	<p>The student will solve a system of linear inequalities in two variables with business and economic applications.</p> <ul style="list-style-type: none"> • Determine whether an ordered pair of numbers is a solution of an inequality in two variables. • Graph linear inequalities in two variables. • Graph a region defined by linear inequalities. • Solve an application of a system of linear inequalities. • Find the total-profit equation and the break-even point given the total-cost and total-revenue equations. • Find the equilibrium point when the supply and demand equations are given.
	<p>The student will solve a system of equations using matrices, determinants, and Cramer's Rule.</p> <ul style="list-style-type: none"> • Calculate a second-order determinant • Evaluate a third-order determinant • Solve a system of equations using Cramer's Rule • Solve a system of two or three equations using matrices
<p>Unit 4 Polynomials and Polynomial Equations</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Perform multi-functional operations involving polynomials. • To factor polynomial expressions with applications.
	<p>The student will perform multi-functional operations involving polynomials.</p> <ul style="list-style-type: none"> • Identify like terms • Find the degree of each term and the degree of a polynomial • Identify monomials, binomials, and

	<p>trinomials</p> <ul style="list-style-type: none"> • Arrange polynomials in ascending and descending order • Evaluate a polynomial equation • Add, subtract, multiply, and divide polynomials • Square binomials • Calculate the products, sum, and differences of a polynomial
	<p>The student will factor polynomial expressions with applications.</p> <ul style="list-style-type: none"> • Factor monomials • Factor by grouping • Factor trinomials of the type $x^2 + bx + c$ • Factor trinomials of the type $ax^2 + bx + c$ where $a \neq 1$ • Factor a trinomial square and a difference of squares • Factor a sum or difference of cubes • Solve quadratic equations already factored by using the principle of zero product • Solve a quadratic equation by factoring first than using the principle of zero product to achieve the two solutions • Solve applications of polynomial equations
<p>Unit 5 Rational Expressions and Equations</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Add, subtract, multiply, divide, and simplify rational expressions. • Solve complex rational expressions and rational equations. • Solve applications of rational equations.
	<p>The student will add, subtract, multiply, divide, and simplify rational expressions.</p> <ul style="list-style-type: none"> • Determine all values of a variable for which a rational expression is undefined. • Multiply a rational expression by 1 using an expression like B/B • Simplify a rational expression. • Multiply a rational expression and

	<p>simplify.</p> <ul style="list-style-type: none"> • Divide a rational expression and simplify. • Find the LCM of several algebraic expressions by factoring. • Add and subtract rational expressions. • Simplify a combination of additions and subtractions of rational expression. • Divide a polynomial by a monomial. • Divide a polynomial by a division that is not a monomial. • Use synthesise division to divide a polynomial by a binomial of the type $x - a$.
	<p>The student will solve complex rational expression and rational equations.</p> <ul style="list-style-type: none"> • Simplify a complex rational expression. • Solve a rational equation.
	<p>The student will solve an application of rational equations.</p> <ul style="list-style-type: none"> • Solve work problems and certain basic problems using rational equations. • Solve motion problems using rational equations. • Solve a formula for a specified letter. • Find an equation of direct variations given a pair of values of the variables. • Solve an applied problem involving direct variation. • Find an equation of inverse variation given a pair of values of the variables. • Solve applied problems involving inverse variation. • Find equations of other kinds of variations given values of the variables. • Solve applied problems involving other kinds of variations. • Find equations of other kinds of variations given values of the variables. • Solve applied problems involving other kinds of variations.

<p>Unit 6 Radical Expressions and Equations</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve radical expressions and equations. • Multiply, divide, simplify, add and subtract radical expressions. • Solve radical expressions and equations with applications and complex numbers.
	<p>The student will solve and simplify radical expressions and equations.</p> <ul style="list-style-type: none"> • Find the principle square root and their opposite. • Approximate square root. • Find values of square root. • Find values of square-root expression. • Graph square root equations • Find the set of acceptable replacements in a square root expression. • Simplify radical expression with perfect square radicands. • Find cube roots, simplifying certain expressions, and finding values of cube root expressions. • Simplifying certain expressions involving odd and even roots. • Write expressions with or without rational exponents, and simplify if possible. • Use the laws of exponents with rational exponents. • Use rational exponents to simplify radical expressions.
	<p>The student will multiply, divide, simplify, add, and subtract radical expressions.</p> <ul style="list-style-type: none"> • Multiply and simplify radical expression. • Divide and simplify radical expression. • Add or subtract with radical notation and simplify. • Multiply expression involving radicals in which some factors contain more than one • Rationalize the denominator of a

	<p>radical expression having one term in the denominator.</p> <ul style="list-style-type: none">• Rationalize the denominator of a radical expression having two terms in the denominator.
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<p>Unit 7 Functions and Graphs</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Identify functions, find function values, and solve application of functions. • Find the domain and range of a function and do basic operations with functions.
	<p>The student will identify functions, find function values and solve applications of functions.</p> <ul style="list-style-type: none"> • Determine whether a correspondence is a function. • Find function values (outputs) for specified vales (inputs), given a function described by an equation. • Draw the graph of a function. • Determine whether a graph is that of a function using the vertical-line test. • Solve applied problems involving functions and their graphs.
	<p>The student will find the domain and range of a function and do basic operations with functions.</p> <ul style="list-style-type: none"> • Find the domain and the range of a function. • Calculate the sum, difference, product and quotient of two given functions [f and g].
<p>Unit 8 Quadratic Equations and Functions</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve quadratic equations with application. • Graph quadratic equations. • Solve mathematical models with quadratic equation and solve polynomial radical inequalities.
	<p>The student will solve quadratic equations with application.</p> <ul style="list-style-type: none"> • Solve quadratic equations using the principle of square root. • Find the x – intercepts of the graphs of a related function. • Solve quadratic equations by completing the square. • Solve applied problems using quadratic

	<p>equations.</p> <ul style="list-style-type: none">• Solve quadratic equations using the quadratic formula and approximate solutions using a graphic calculator.• Solve applied problems involving quadratic equations.• Solve a formula for a given letter.• Determine the nature of the solution of a quadratic equation.• Write a quadratic equation having two numbers specified as solutions.• Solve equations that are quadratic in form.
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	<p>The student will graph quadratic equations.</p> <ul style="list-style-type: none"> • Graph quadratic functions of the type $f(x) = ax^2$ and thus label the vertex and the line of symmetry. • Graph quadratic functions of the type $f(x) = a(x - h)^2$ and then label the vertex and the line of symmetry. • Graph quadratic functions of the type $a(x - h)^2 + k$ finding the vertex, the line of symmetry, and the maximum or minimum y – values. • Find the vertex, the line of symmetry and the maximum or minimum value, and graph the function of a quadratic function of the $f(x) = ax^2 + bx + c$.type • Find the intercepts of a quadratic function by analyzing the function and also with the use of a graphic calculator.
	<p>The student will solve mathematical models with quadratic equations and solve polynomial and rational inequalities.</p> <ul style="list-style-type: none"> • Solve maximum – minimum problems involving quadratic functions. • Fit a quadratic function to a set of data to form a mathematical model and solve related applied problems. • Solve quadratic and other polynomial inequalities. • Solve rational inequalities.
<p>Unit 9 Exponential and Logarithmic Functions</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve maximum – minimum problems involving quadratic functions. • Fit a quadratic function to a set of data to form a mathematical model and solve related applied problems. • Solve quadratic and other polynomial inequalities. • Solve rational inequalities.
	<p>The student will graph exponential,</p>

inverse, and composite functions.

- Graph exponential equations and functions.
- Graph exponential equations in which x and g have been interchanged.
- Solve applied problems involving applications of exponential functions and their graphs.
- Find the inverse of a relation if it is described as a set of ordered pairs or as an equation.
- Determine whether a one-to-one function is an inverse that is a function.
- Find a formula for the inverse of a function if it exists.
- Graph inverse relations and functions.
- Find the composition of functions and express certain functions as a composition of functions.
- Determine whether a function is an inverse by checking its composition with the original function.
- Find a formula for the inverse of a function, if it exists.
- Graph inverse relations and functions.
- Find the composition of functions and express certain functions as a composition of functions.
- Determine whether a function is inverse by checking its composition with the original function.

	<p>The student will graph logarithmic and natural functions and applied the properties of logarithmic function.</p> <ul style="list-style-type: none"> • Graph logarithmic function. • Convert from exponential equation to logarithmic equations and from logarithmic equations to exponential equations. • Solve logarithmic equations. • Find common log using a calculator. • Express the log of a product as a sum of logs and conversely. • Express the log of a power as a product and conversely. • Express the log of a quotient as a difference of log and conversely. • Convert from logarithmic of products, quotients, and powers to expressions in terms of individual logarithmic and conversely. • Simplify expressions of the type $\log_a a^a$ • Find log or power base e using a calculator. • Use the change of base formula to find logarithmic to base others than e or 10. • Graph exponential and logarithmic functions, base e.
	<p>The student will solve exponential and logarithmic equations.</p> <ul style="list-style-type: none"> • Solve exponential equations. • Solve logarithmic equations. • Solve applied problems involving logarithmic functions. • Solve applied problems involving exponential functions.
<p>Unit 10 Conic Sections</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Graph nonlinear equations • Apply formulas for distance and midpoint • Solve nonlinear systems of equations
	<p>The student will graph nonlinear equations.</p> <ul style="list-style-type: none"> • Graph equations of parabolas

$$y = ax^2 + bx + c$$

$$x = ay^2 + by + c$$

- Graph a circle:
 - given the equation
 - after writing the equation given the center and radius
- Graph the standard form of the equation of an ellipse:
 - with its center at the origin
 - not centered at the origin
- Graph the standard form of the equation of a hyperbola

	<p>The student will apply formulas for distance and midpoint.</p> <ul style="list-style-type: none"> • Use the distance formula to find the distance between two given points • Use the midpoint formula when the coordinates of a segment's endpoints are known.
	<p>The student will solve nonlinear systems of equations.</p> <ul style="list-style-type: none"> • Determine whether an ordered pair is a solution of a nonlinear system of equations. • Solve systems of two equations in two variables in which one equation is linear by: <ul style="list-style-type: none"> -substitution method -sketching the graph • Solve systems of two second-degree equations, by either substitution method or the elimination method. • Solve applied problems involving nonlinear systems.
<p>Unit 11 Trigonometry</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve a right triangle for all its angles and sides. • Solve oblique triangle using the Law of Sine and Law of Cosine. • Solve problem involving trigonometry and circular functions..
	<p>The student will solve a right triangle for all its angles and sides.</p> <ul style="list-style-type: none"> • Identify the four types of triangles. • Identify the sides of a right triangle with reference to any angle. • Find the missing angle of a triangle. • Find the missing angles of many triangles within one triangle. • Use Pythagorean Theorem to solve a triangle. • Solve a triangle using trig ratios.
	<p>The student will solve oblique triangles using the Law of Sine and Cosine.</p> <ul style="list-style-type: none"> • Solve oblique triangles using the Law of Sine.

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| | <ul style="list-style-type: none">• Solve an oblique triangles using the Law of Cosine. |
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	<p>The student will solve problems involving Trigonometry and circular functions.</p> <ul style="list-style-type: none"> • Identify quadrants from angular measure • Use the six trig functions to calculate values and their sign • Determine angular values of Trig functions • Identify points on a unit circle and its reflection across the u-axis, the v-axis and the origin. • Convert between radian measure and degree measure. • Find the length of an arc of a circle and angular speed.
<p>Unit 12 Sequence and Series</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Solve problems using arithmetic sequence and series • Solve problems using geometric and infinite sequence and series • Solve problems using the binomial theorem.
	<p>The student will solve problems using arithmetic sequence and series.</p> <ul style="list-style-type: none"> • Find the nth term when n is given and a when the nth term is given, and given two terms. • Find the common difference and construct a sequence. • Find the sum of the first n terms of an arithmetic sequence.
	<p>The student will solve problems using geometrical and infinite sequence and series.</p> <ul style="list-style-type: none"> • Identify the common ratio of a geometric sequence. • Find a given term and the sum of the first n term • Find the sum of an infinite geometric series, if it exists.
	<p>The student will solve problems using the binomial theorem.</p> <ul style="list-style-type: none"> • Expand a binomial using Pascal

	<p>triangles</p> <ul style="list-style-type: none"> • Solve a problem in expansion using the binomial theorem.
<p>Unit 13 Statistics and Probability</p>	<p>Upon completion of this unit the student will be able to:</p> <ul style="list-style-type: none"> • Collect and display data. • Analyze data. • Use probability theory to predict outcomes. • Make decisions and predictions using the data.
	<p>The student collects and displays data.</p> <ul style="list-style-type: none"> • Collect data from a representative sample of a population • Organize the data in tables, charts and graphs
	<p>The student analyzes data.</p> <ul style="list-style-type: none"> • Describe the data as a function if possible • Calculate the measures of central tendency • Calculate the standard deviation of the sample • Compare graph to normal curve
	<p>The student uses probability theory to predict outcomes.</p> <ul style="list-style-type: none"> • Distinguish between theoretical and experimental probability • Apply area and tree diagrams to determine probabilities • Calculate the probability of dependent and independent events
	<p>The student makes decisions and predictions using the data.</p> <ul style="list-style-type: none"> • Interpolate and extrapolate the information from the function • Use the normal curve to establish the probability of an event • Establish confidence levels for their predictions • Use the data to support a decision