**Algebraic College Readiness Course**

**Description**

Topics for all formats include special products and factoring, rational expressions and equations, rational exponents, radicals, radical equations, quadratic equations, absolute value equations and inequalities, complex numbers, equations of lines, an introduction to the function concept, and graphing.

**Algebraic College Readiness Course Outcomes**

* Define, represent, and perform operations on real and complex numbers.
* Recognize, understand, and analyze features of a function.
* Recognize and use algebraic (field) properties, concepts, procedures (including factoring), and algorithms to combine, transform, and evaluate absolute value, polynomial, radical, and rational expressions.
* Identify and solve absolute value, polynomial, radical, and rational equations.
* Identify and solve absolute value and linear inequalities.
* Model, interpret and justify mathematical ideas and concepts using multiple representations.
* Connect and use multiple strands of mathematics in situations and problems, as well as in the study of other disciplines.
* Solve quadratic equations and applications using methods including the quadratic formula, factoring, completing the square, and extracting roots.

**Following is a detailed list of the concepts to be covered in order to completely cover the course outcomes above.**

**Linear Equations, Linear Inequalities, Absolute Value Equations, and Absolute Value Inequalities**

1. Recognize and solve linear equations. Solve applications of linear equation problems.
2. Recognize and solve linear inequalities, write the solution using set notation and interval notation, and graph the solution on a number line.
3. Recognize and solve compound inequalities, write the solution using set notation and interval notation, and graph the solution on a number line. Compound inequalities include three part inequalities (-5 < 5x-3 < 23), and compound statements using ***and*** and ***or***. Inequalities with no solution or solution of all real numbers should be included.
4. Solve applications using linear inequalities.
5. Understand the meaning of absolute value. Solve an absolute value equation of the form |ax + b| = c and |ax + b| = |cx +d|.
6. Solve applications using absolute value equations.
7. Solve absolute value inequalities, state the solution in set notations and interval notation, and graph the solution on a number line.

**Linear Equations and Linear Inequalities in Two Variables and Functions**

1. Draw and label the x and y axes and plot an ordered pair.
2. Determine if an ordered pair is a solution to an equation by substituting the values into the equation.
3. Recognize a linear equation, make a table of ordered pair solutions, plot and graph the line.
4. Determine the x and y intercepts, write in ordered pair form, plot the intercepts and graph the line using the intercepts.
5. Graph linear equations of the form y = a and x = b. List ordered pairs that satisfy these equations and graph the lines.
6. Solve application problems of linear equations.
7. Understand the concepts of slope, positive slope, negative slope, slope equal to 0 and undefined slope, determine the slope of a line from its graph including horizontal and vertical lines, and use the slope formula to find the slope of the line through any two given points.
8. Recognize what the slope of a line represents in an application and use slope to solve application problems.
9. Graph the line given a point and the slope, two points, or the equation.
10. Using the slope intercept form and/or the point slope form, write the equation of a line given its slope and y-intercept, slope and point on line, or two points on the line. Be able to leave equation in slope intercept form and standard form.
11. Write equations of horizontal lines, vertical lines and lines parallel or perpendicular to a given line through a given point.
12. Use slope to determine if two lines are parallel, perpendicular or oblique.
13. Write and solve linear equations to model applications.
14. Graph a linear inequality in two variables. Given the graph of a linear inequality, determine if a given ordered pair is a solution to the inequality.
15. Define and identify relations, functions, domain, and range. Use the vertical line test to determine if a relation is a function given its graph.
16. Use function notation when evaluating functions for given values of the independent variable. Find the range for a given domain for functions represented by ordered pairs or graphs. Given the domain, find the range of a function given in equation form.
17. Graph a linear function using slope and y-intercept.
18. Solve applications problems using linear functions.

**Factoring Polynomials**

1. Factor using GCF, factor by grouping, factor a trinomial () with ***a*** equal to 1 and ***a*** unequal to 1. Factor a difference of two squares, perfect square trinomials, and the sum and difference of two cubes. Factor polynomials containing two variables.
2. Solve a quadratic equation by factoring. Solve higher degree polynomial equations by factoring. Solve applications of quadratic equations using factoring.

**Rational Expressions, Equations, and Functions**

1. Recognize a rational function and write the domain in set notation and interval notation.
2. Write a rational expression in lowest terms
3. Add, subtract, multiply and divide rational expressions
4. Simplify complex fractions
5. Solve rational equations, including proportions.
6. Solve application problems using rational equations (distance, rate, time problems, mixture problems, work problems, proportion applications.

**Radicals and Rational Exponents**

1. Find square roots and higher roots. Simplify square root expressions including those containing exponents in the radicand such as .
2. Simplify expressions containing rational expressions. Change radical expressions to rational exponent expressions, and rational exponent expressions to radical expressions.
3. Simplify rational expressions with negative exponents, including negative rational exponents.
4. Simplify expressions involving exponent rules (ex. 
5. Add, subtract, multiply and divide square root expressions. Rationalize the denominator including expressions with a radical in the denominator containing a binomial (ex. )
6. Solve radical equations including equations that result in a linear equation, quadratic equation and extraneous roots. Solve both square root and cube root equations.
7. Solve application problems or formulas using radical equations.
8. Simplify, add, subtract, multiply and divide complex numbers. Simplify powers of ***i***.

**Quadratic Equations and Functions**

1. Solve quadratic equations by taking the square root, factoring, completing the square and using the quadratic formula. Be able to choose the most efficient method for solving a given quadratic equation.
2. Use the discriminant to determine the type and number of solutions for a given quadratic equation.
3. Solve application problems using quadratic equations, including height of a projectile, Pythagorean Theorem, rate and time, geometry.
4. Graph a quadratic function. Identify the vertex, axis of symmetry, which way the parabola opens and whether it has a max or min.