**Course Description**: After a brief review of basic algebra, topics in Algebra 2 include quadratic functions and factoring, polynomial functions, roots and radicals, logarithmic and exponential functions, rational functions, complex numbers, analytic geometry, variation, sequences and series, and a brief introduction to matrices. Class will be a combination of brief lecture, worked examples, projects, group work, board work, individual written work, frequent quizzes and some tests. In order to be successful, students must have demonstrated competence in both Algebra I and Geometry.

**Student Targets**: (Common Core Math Standards are listed after each target. The entire document can be found at <http://www.corestandards.org/Math>)

By the end of this course….

* + - I will be able to use the complex number i where i2=-1 and the commutative, associative, and distributive property to add, subtract, and multiply complex numbers of which all have the form a+bi where a and b are real numbers. N.CN.1,N.CN.2
    - I will be able to solve quadratic equations with real coefficients that have complex solutions. N.CN.7
    - I will be able to interpret parts of an expression, and interpret complicated expressions by viewing one or more of their parts as a single entity and I will be able to use the structure of an expression to identify ways to rewrite it. A.SSE.1a, A.SSE.1b, A.SSE.2
    - I will be able to derive the formula for the sum of a finite geometric series and use the formula to solve problems. (ex: mortgage rates) A.SSE.4
    - I will be able to add, subtract and multiply polynomials. A.APR.1
    - I will be able to apply the remainder theorem when dividing polynomials. A.APR.2
    - I will be able to identify zeros of polynomials and use zeros to construct a rough graph of the function defined by the polynomial. A.APR.3
    - I will be able to prove polynomial identities and use them to describe numerical relationships. A.APR.4
    - I will be able to apply the Binomial Theorem and know that it gives the expansion of (x+y)n A.APR.5+
    - I will be able to rewrite simple rational expressions in different forms using inspection, long division or a computer algebra system. A.APR.6
    - I will be able to add, subtract, multiply and divide rational expressions. A.APR.7+
    - I will be able to create equations and inequalities in one or more variables, use them to solve problems, and graph equations on the coordinate axes with labels and scales. A.CED.1
    - I will be able to represent constraints by equations/inequalities and by systems and interpret solutions as viable or non-viable. A.CED.2, A.CED.3
    - I will be able to rearrange formulas to highlight a quantity of interest. A.CED.4
    - I will be able to solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. A.REI.2
    - I will be able to represent a system of linear equations as a single matrix equation in a vector variable, and find the inverse of a matrix if it exists and use it to solve systems of linear equations. A.REI.8+, A.REI.9+
    - I will be able to explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equation f(x)=g(x) for cases of linear, polynomial, rational, absolute value, exponential, and logarithmic functions. A.REI.11
    - I can use mean and standard deviation to fit a normal distribution and estimate populations and areas under the curve. S.ID.4
* I can show that a function has a domain and a range and for every input there is one and only one output and evaluate these functions in function notation. F.1F.1, F.1F.2, F.1F.3
* I can interpret key features of graphs and tables in terms of the quantities, sketch graphs showing key features given a verbal description of the relationship (intercepts, symmetries, end behavior, increasing, decreasing, etc), relate the domain of a function to its graph and to the quantitative relationship it describes (time to distance), and calculate and interpret the average rate of change of a function. F.1F.4, F.1F.5, F.1F.6
* I can graph linear, quadratic, square root, cube root, piecewise defined, absolute value, polynomial, exponential, rational, logarithmic, and trigonometric functions and show intercepts, maxima, minima, explain end behavior, find zeros and intercepts, asymptotes, period, midline, and amplitude. F.1F.7b, F.1F.7c,F.1F.7e,F.1F.8,F.1F.9,F.1F.7d+
* I can use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and use properties of exponents to interpret expressions for exponential functions and classify them as exponential growth or decay. F.1F.7b, F.1F.7c,F.1F.7e,F.1F.8,F.1F.9,F.1F.7d+
* I can compare properties of two functions each represented in a different way. F.1F.7b, F.1F.7c,F.1F.7e,F.1F.8,F.1F.9,F.1F.7d+
* I can write a function that describes a relationship between two quantities and combine standard function types using arithmetic operations as well as with composite functions. I can write arithmetic and geometric sequences and use them to model situations as well as translate between the two forms. F.BF.1b, F.BF.1c
* I can identify the effect on the graph of f(x) by replacing it with f(x)+k, f(kx), k\*f(x), and f(x+k), find the value of k given the graph by hand as well as with technology. F.BF.3, F.BF.4a, F.BF.4b+, F.BF.4c+. F.BF.4d+, F.BF.5+,F.LE.4
* I can solve an equation of the form f(x)=c for a simple function f that has an inverse and write an expression for the inverse, verify by composition that one function is the inverse of another, read values of an inverse function from an graph or a table given that the function has an inverse, and produce an invertible function from a non-invertible function by restricting the domain. F.BF.3, F.BF.4a, F.BF.4b+, F.BF.4c+. F.BF.4d+, F.BF.5+,F.LE.4
* I can find inverse functions and understand the inverse relationship between exponents and logarithms and use the relationships to solve problems F.BF.3, F.BF.4a, F.BF.4b+, F.BF.4c+. F.BF.4d+, F.BF.5+,F.LE.4
* I can express as a logarithm the solution to ab^(ct)=d and evaluate the logarithm using technology. F.LE.4
* I can explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted by radian measures of angles traversed counterclockwise around the unit circle, and understand radian measure of an angle as the length of the arc on the unit circle. F.TF.1,F.TF.2
* I can choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. F.TF.5
* I can prove the Pythagorean Identity and use it to find sin A, cos A, tan A, and the quadrant of the angle. F.TF.8
* I can derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or differences of distances from the foci is constant. G.GPE.3+
* I can give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures. G.GMD.2+
  + - I will be able to recognize data sets for which normal distributions and associated reckoning is not appropriate. S.ID.4
    - I will be able to explain in context the difference between values describing a population and a sample. S.ID.1
    - I will be able to explain how well and why a sample represents the variable of interest from a population. S.IC.1
    - I will be able to demonstrate understanding of the different kinds of sampling methods. S.IC.2
    - I will be able to design simulations of random sampling: assign digits in appropriate proportions for events, carry out the simulation using random number generators and random number tables and explain the outcomes in context of the population and the known proportions. S.IC.3
    - I will be able to identify, design and evaluate situations as either sample survey, experiment, or observational study and discuss the appropriateness the limiting factors of each as well as randomness. S.IC.4
    - I will be able to use sample means and sample proportions to estimate population values and conduct simulations of random sampling to gather sample means and sample proportions and interpret results. S.IC.5
    - I will be able to evaluate effectiveness and differences in two treatments based on data from randomized experiments and use simulations to generate data simulating application of two treatments to evaluate the significance of differences. S.IC.6
    - I will be able to read and explain in context data from outside reports. S.IC.6
    - I will be able to make decisions based on expected values. Use expected values to compare long term benefits of several decisions and explain how the decisions were reached. S.MD.6,+S.MD.7

The the main focus standards for this course are:

Linear Equations

Inequalities

Functions

Systems

Quadratic Functions

Polynomial Functions

Radical Functions

Rational Exponents

Nonlinear Functions and Relations

Counting Methods

Probability

Data Analysis

**Grading Practices**: Grades are divided into four main categories.

In accordance with the competencies of the Mathematics Department, assessments will gauge communication, application, modelling and process of the individual mathematical concept. Each individual assessment will be divided into these categories and each competency will comprise 25% of a student’s grade.

**Timeline/Scope and Sequence**:

|  |  |  |  |
| --- | --- | --- | --- |
| Quarter One | Quarter Two | Quarter Three | Quarter Four |
| Equations and Inequalities  Linear Equations and Functions | Linear Systems and Matrices  Quadratic Functions and Factoring  Polynomials and Polynomial Functions | Rational Exponents Exponential and Logarithmic Functions  Rational Functions | Counting Methods and Probability  Data Analysis and Statistics |

**Office Hours:**

I am available most every day after school (by prior arrangement) for extra help, make-up assignments, etc. Additionally, 3rd block on A days or 2nd block on B days are options for assistance (again, by appointment.) Lunch and break may also be good times for a quick problem.

**Please complete the following to indicate that you have read and understood the syllabus. In order to facilitate parent/teacher communication, please supply current contact information. Forms need to be returned prior to 9/5/14.**

Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Name (printed): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Email:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Phone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Best way to contact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_