**Franklin High School Algebra 3 -- 2019-2020**

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**Required Supplies:** EVERY DAY bring a pencil and math notebook or binder.
Recommended supplies: TI-84 Calculator, colored pencils, 6 inch ruler, and highlighters.

**Expectations:** Attend class on-time everyday and bring the required supplies. Work with your table mates to complete all warm-ups, investigations, assignments and group tests.

- **Hall passes:** Success in studying math requires that you make good use of class time. Everyone is given TWO hall passes per semester. If they are not used they may be turned in for additional points on the final exam.

- **Daily warm-ups:** Warm-ups are kept in your math notebook with any notes presented in class. If you arrive in class on-time and attempt the warm-up in a timely manner, you will receive a stamp on the unit overview sheet.

- **Assignments**: Each class you will receive an assignment to practice the learning target covered that day. Most assignments will be broken up into sections containing C-level problems and B-level problems. The expectation is that any work not completed in class is completed as homework. At the start of each class, if you have completed the assignment through C-level problems and at least one B-level problem, you will receive a stamp on the unit overview sheet.

- **Unit overview sheet:** Before each unit you will receive a unit overview sheet. On this sheet you will keep track of stamps you receive for warm-ups and on-time homework. This is also your cheat sheet that can be used during the exam. During test corrections you may exchange 10 stamps for a second rough grade or have me point (no words) regarding where you should focus your attention in correcting one problem.

- **Exams:** The unit overview sheet will contain all test dates for that unit. Exams will be broken up between C-level, and A/B-level problems. During exams you may use your unit overview which will be turned in with the exam. The class will receive a limited amount of time to then make corrections. During those test corrections stamps can be exchanged as discussed above.

- **Retake exams:** Students can retake an exam during tutorial. There are no test correction opportunities on a retake exam and stamps cannot be redeemed on a retake exam. In order to retake a test the student must bring in the stamp sheet and/or all of the worksheets for that unit to establish that all C-level problems were completed and have a cheat sheet. The retake test grade can be no higher than 85%.

**IF YOU MISS CLASS** it is *your responsibility* to be prepared for the next class.
- Extra copies of notes, investigations and worksheets will be placed in the class notebook.
- A missed exam will render a 0% until the test has been made up.

**GRADING POLICY:**
- Your semester grade will be 100% unit tests:

- No extra credit will be given in this class.

This syllabus may change as necessary to meet the needs of the students throughout the semester.

**Differentiation Strategies:**
Students will be given open-ended questions on a daily basis; they will be able to determine the level of difficulty themselves. Whenever possible, students will be given options of two different tasks; they will have the choice of which will be more accessible for them.
Honors credit is available for students interested.
Copies of notes will be available to all students for each unit posted on my website as well.

**Standards Covered**
*Please be aware that the standards below are very wide, and can be interpreted in many ways. The skills that will be assessed in each unit will be made clear on the Unit Stamp Sheets students receive at the beginning of each unit. These may also be found on my website as we reach each unit.*

**Unit 1: Equations and Inequalities**
**Priority Standards:**
**HSA.CED.A.1** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.
**HSA.CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
**Supporting Standards:**
**HSA.REI.A.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
**HSA.CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.
**HSA.CED.A.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R*.

**Unit 2: Parent Graphs**
**Priority Standards:**
**HSF.IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.*
**HSF.IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
**HSF.IF.C.7.B** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
**HSF.BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
**HSF.IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
**Supporting Standards:**
**HSF.IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
**HSA.SSE.B.3.A** Factor a quadratic expression to reveal the zeros of the function it defines.
**HSA.SSE.B.3.B** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
**HSG.GPE.A.2** Derive the equation of a parabola given a focus and directrix.
**HSF.BF.A.1** Write a function that describes a relationship between two quantities.*

**Unit 3: Inverses**
**Priority Standards:**
**HSF.BF.B.4** Find inverse functions.

**HSF.BF.B.4.A** 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. *For example, f(x) =2 x3 or f(x) = (x+1)/(x-1) for x ≠ 1*.

**Unit 4: Logarithms and Exponentials**

**Priority Standards:**

**HSF.LE.A.4** For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where *a*, *c*, and *d*are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology.

**HSF.IF.C.7.E** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

**Supporting Standards:**

**HSF.IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.*

**HSF.IF.C.8.B** Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.

**HSF.BF.A.1.A** Determine an explicit expression, a recursive process, or steps for calculation from a context**.**

**HSF.BF.A.1.B** Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model*.

**HSA.SSE.A.1.B** Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P*.

**Unit 5: Complex Numbers and Roots**

**Priority Standards:**

**HSN.CN.A.1** Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form *a + bi* with *a* and *b* real.

**HSN.CN.A.2** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

**HSN.CN.C.7** Solve quadratic equations with real coefficients that have complex solutions.

**Unit 6: Polynomials**

**Priority Standards:**

**HSA.APR.A.1** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

**HSA.APR.B.3** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

**HSF.IF.C.7.C** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

**Supporting Standards:**

**HSA.APR.B.2** Know and apply the Remainder Theorem: For a polynomial *p*(*x*) and a number *a*, the remainder on division by *x - a* is *p*(*a*), so *p*(*a*) = 0 if and only if (*x - a*) is a factor of *p*(*x*).

**HSA.APR.C.4** Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.*

**HSA.SSE.A.**1 Interpret expressions that represent a quantity in terms of its context.*

**HSA.SSE.A.1.A** Interpret parts of an expression, such as terms, factors, and coefficients.

**HSA.SSE.A.1.B** Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P*.

**HSF.IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.*

**HSF.BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them

## Unit 7: Rational Expressions

**Priority Standards:**

**HSA.APR.D.6** Rewrite simple rational expressions in different forms; write $^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.

**Supporting Standards:**

**HSA.SSE.A.2** Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 – y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.*

**HSA.SSE.B.3.A** Factor a quadratic expression to reveal the zeros of the function it defines.

**HSN.RN.B.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational

## Unit 8: Trigonometric Functions

**Priority Standards:**

**HSF.TF.A.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

**HSF.TF.B.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*

**HSF.IF.C.7.E** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

**Supporting Standards:**

**HSF.TF.A.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

**HSF.TF.C.8** Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

**HSF.IF.B.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.*

## Unit 9: Statistics

**Priority Standards:**

**HSS.ID.A.4** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve

**Supporting Standards:**

**HSS.IC.A.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

**HSS.IC.A.2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model*?

**HSS.IC.B.3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

**HSS.IC.B.4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

**HSS.IC.B.5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**HSS.IC.B.6** Evaluate reports based on data.