Functions, Statistics, and Trigonometry

Instructor:	Kevin Denney
Contact:	Email: kdenney@pps.net Cell: 503-866-6003
Functions, Statistics, and Trigonometry (FST):	This course is a fourth year math class and considered an upper level math class. Students should have passed Algebra, Geometry, and Advanced Algebra. The class will cover some of the basics of both Precalculus and Statistics. The students will be tested on each chapter and a cumulative final at the end of each semester.
Text:	We will be using the book, Functions, Statistics, and Trigonometry by The University of Chicago School of Mathematics Project, everyday except review and test days. The book is a good book, though it is old and some of the symbolism and terminology is outdated. Select odd answers are in the back of the book. Students are encouraged to check their answers in the book as they go. This is to ensure they do not learn the steps incorrectly.
Grading:	90% Summative Assessment. 10% Formative Assignment.
Classwork:	Students will go through approximately 5-10 problems in class with me.
Homework:	The students will do approximately 10-20 problems from the section covered that day. Students should be able to finish the assignment in class. In the cases of review assignments, there will be specifically a class assignment worksheet and a homework assignment worksheet.
Review Worksheets:	The students will get at least two review days before each test, except chapter 1. On these days, we will do a review worksheet for classwork and another review worksheet as homework.
Tests:	Semester 1: Chapter 1 (take home), Chapter 2, Chapter 3, Chapter 4, Final 1-4. Semester 2: Chapter 5, Chapter 6, Chapter 7, Chapter 8, Final 5-8. Each test can be retaken once.
Late work:	Late work will be accepted until the end of the grading period, semester. I do not encourage students to fall that far behind, but I will always reward the effort to catch up.
Work Samples:	We will do a work sample at the end of the first semester. The work sample can count for essential skills credit.
Goal:	It is my goal to make sure that every student has fun and enjoys the class. I hope to bring back some of the love of math that young students lose along the way.

Please feel free to contact me at any time with any concerns. Thank you.
Due t many possible reasons synopsis is subject to change.

Resources:
My website is on the Franklin staff page. You simply go to the date you missed and you will find the section and what was covered for notes and the assignment problems for that day. Franklin also offers a tutoring center, which I recommend. We have tutorials during full 5-day weeks, but it is rare that I am available for intensive one-on-one tutoring. Students can also contact me with questions through email or text.

Differentiation Strategies:
Students will be given tiered questions on a daily basis; we will be able to determine the level of difficulty they reach by how far they get in the assignment. Students will be able to learn the basics as well as to push themselves by finishing all of the assignment. Vocabulary will be available to all students for each unit. Vocabulary will be covered in the notes for each lesson as well as the most common mistakes made for each topic.

Standards Covered
Please be aware that the standards below are very wide, and can be interpreted in many ways. This class will review many of the standards from Advanced Algebra. It will also introduce standards for precalculus and statistics.

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.*

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 $x \neq 1$.

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 dare 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.

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

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.*

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.