Verona Public School District
Curriculum Overview

Algebra 1

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Verona Public Schools
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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

In this course students have the opportunity to develop a solid foundation in Algebra. Students will learn how to utilize and analyze algebraic concepts leading to a deeper understanding of mathematics and stronger critical thinking skills. Topics for this course include Number Sense and Operations, Algebraic Expressions, Linear Functions, Linear Equations and Inequalities, Nonlinear Relationships and Data and Statistical Analysis. Graphing calculators will be an important tool that will routinely be used in instruction.

Prerequisite(s):

6th Grade Above and (7th Grade Pre-Algebra or 8th Grade Pre-Algebra)

Standard 8: Technology Standards

8.1: Educational Technology: *All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.*	**8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming:** *All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*
X A. Technology Operations and Concepts **X** B. Creativity and Innovation C. Communication and Collaboration D. Digital Citizenship E. Research and Information Fluency **X** F. Critical thinking, problem solving, and decision making	**X** A. The Nature of Technology: Creativity and Innovation B. Technology and Society C. Design D. Abilities for a Technological World E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: *These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities*	**Career Ready Practices:** *These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.*
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	**X** CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. CRP6. Demonstrate creativity and innovation. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	**X** CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	**X** CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: *This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.*	**9.2: Career Awareness, Exploration & Preparation:** *This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.*	**9.3: Career and Technical Education:** *This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.*
X A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing **X** E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	A. Career Awareness (K-4) B. Career Exploration (5-8) **X** C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing **X** O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: *These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.*	**Differentiated Resources**: *These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.*
• Pearson Algebra 1 Common Core © 2011	• NJ Model Curriculum • Delta Math • NJCTL • Pearson Sample PARCC items • Eureka Math: A Story of Functions Modules • Various online sources

Verona High School / H.B. Whitehorne Algebra 1

Unit Title: Linear Equations **Unit Duration: 2 months**	**Cross-curricular Opportunities: Sciences**

Stage 1: Desired Results

Established Goals:

N.Q.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N.Q.2 - Define appropriate quantities for the purpose of descriptive modeling.
N.Q.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.SSE.1 - Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. 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.
A.CED.1 - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions.
A.CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.3 - Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
A.CED.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.
A.REI.1 - Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.3 - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
F.IF.1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
F.IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
F.IF.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.
F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★
a. Graph linear functions.
F.IF.9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
A.REI.11 - 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); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…evaluate linear functions using all representations to interpret real life situations.

Students will understand that:

U1. An equation represents two quantities that are equal and can be used as a tool to find an unknown value
U2. Algebraic expressions and equations generalize relationships for specific cases
U3. Problems can be represented Algebraically with graphs, tables and data displays
U4. Linear functions are written in various forms.
U5. Linear functions can be graphed using input/output tables.
U6. Linear functions can be graphed using x and y-intercepts.
U7. Finding the slope of an equation is determined by the rate of change.
U8. Lines can be horizontal or vertical.
U9. Lines are parallel if their slopes are equal
U10. If non-vertical lines are perpendicular, then their slopes multiply to equal -1.
U11. Given a line and a point, a parallel or perpendicular equation can be found.

Students will keep considering:

Q1. Why do we use equations to solve problems?
Q2. Why do you perform operations on BOTH sides of an equation?
Q3. How is thinking algebraically different from thinking arithmetically?
Q4. What forms can linear functions be written in?
Q5. How can an input/output table be used to graph a linear function?
Q6. How can linear equations be graphed using the x and y-intercept?
Q7. How can the slope be found between two points?
Q8. What types of equations graph horizontal or vertical lines?
Q9. How are lines determined to be parallel?
Q10. What proof can be used to show that lines are perpendicular?
Q11. How do you write the equation of a line that is parallel or perpendicular to a given line?

Students will know:

K1. The difference between an equations and an expression
K2. How to solve multi-step problems that can be represented algebraically with accurately and appropriately defined units, scale and models.
K3. Properties needed to solve linear equations
K4. Linear equations can be converted from one form to another
K5. There are different representations of slope
K6. Parallel and perpendicular lines are related to each other through their slopes.

Students will be skilled at:

A1. Solving all types of linear equations and inequalities
A2. Graphing the solution to equations and inequalities
A3. Representing solutions in different ways
A4. knowing which operations to apply and the correct order to apply them
A5. Solving equations with fractional coefficients
A6. Using multiplication to eliminate like and unlike denominators

Stage 2: Acceptable Evidence

Performance Task & Unit Assessments:

Students will show that they really understand by evidence of:

- Algebra 1 Pre-Test
  - Algebra 1 Pre-Test Answers
- Algebra 1 Post Test Version 1
- Algebra 1 Post Test Version 2
- Algebra 1 Post Test Version 3
- More Post Test Resources
- Unit 1 Linear Equations Quiz
  - Unit 1 Linear Equations Quiz Answers
  - Quiz Review
  - Quiz Review Answers
  - Unit 1 Linear Equations Quiz RETAKE
- Name Graphing Project
  - Name Graphing Example
- Linear Equations Review Activity
- 3-4 Notes, LQ, HW and Answers
- 4-1 Notes, LQ, HW and Answers
- 4-2 Notes, LQ, HW and Answers
- 5-1 Notes, LQ, HW and Answers
- 5-3 Notes, LQ, HW and Answers
- 5-5 Notes, LQ, HW and Answers
- 5-6 Notes, LQ, HW and Answers
- 6-5 Notes, LQ, HW and Answers

Other Evidence:

Students will show that they have achieved Stage 1 goals by:

Formal:
- Providing written/oral response to the EQs
- Passing all quizzes on basic concepts in unit.

Informal:
- Students should also troubleshoot examples and explain misapplications of the conventions or properties.

Reference Materials

- Algebra 1 - Unit 1 Topical Outline
- Spark Note - Linear Equations
- Next Generation PARCC Resources
- PARCC EOY Assessment
- Evidence Table
- Click on the specific Standard to find Sample Tasks
- Regents Exam Questions by topic
- Math Videos By Topic
- Math Assessment Project - Task by Standard
- Linear Equations Extra Practice Sheets and Assessments by J Thai

Verona High School / H.B. Whitehorne Algebra 1

Unit Title: Linear Relationships **Unit Duration: 2 months**	**Cross-curricular Opportunities: Economics, Sciences**

Stage 1: Desired Results

Established Goals:

A.REI.5 *- Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.*
A.REI.6 *- Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.*
A.REI.10 *- Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).*
A.REI.11 *- 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); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*
A.REI.12 *- Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…apply previous knowledge to the idea of systems.

Students will understand that:

U1. Equations can be represented in different ways
U2. Function notation is commonly used in upper level mathematics
U3. Making a table of values can always help make a graph
U4. Depending on the equation formats, some methods of solving systems are better than others
U5. Systems of Inequalities are solved by solving

Students will keep considering:

Q1. How do you choose which method to use to graph an equation?
Q2. Why is function notation important?
Q3. How do you choose which method to use to solve systems?
Q4. What does the solution of a system of inequalities represent?

Students will know:

K1. How to graph multiple lines on one coordinate plane
K2. How to solve linear systems
K3. What the solution of a system of linear inequalities represents
K4. Applications of linear systems

Students will be skilled at:

A1. Graphing Lines
A2. Deciding which method of solving a system is best
A3. Explaining what the solution of a system of linear equations or inequalities represents

Stage 2: Acceptable Evidence

Performance Task & Unit Assessments:

Students will show that they really understand by evidence of:

- Unit 2 Systems Pre Test
  - Unit 2 Systems Pre Test Answers
- Unit 2 Systems of Equations Test
  - Systems of Equations Test ANSWERS
  - Systems Test Review
  - Systems Test Review Answers
  - Systems Extra Credit
    - Systems Extra Credit Answers
- Delta Math Rubric
- Alg 1 Systems and Inequalities PARCC Sample Questions
- Unit 2 Systems Math Investigation
  - Investigation Answers
- Solving Systems Mini Quiz
  - Mini Quiz Answers
- 6-1 Notes, LQs, HW and Answers
- 6-2 Notes, LQs, HW and Answers
- 6-3 Notes, LQs, HW and Answers
- 6-6 Notes, LQs, HW and Answers

Other Evidence:

Students will show that they have achieved Stage 1 goals by:

Formal:
- Providing written/oral response to the EQs
- Passing all quizzes on basic concepts in unit.

Informal:
- Identify parts of a polynomial while working towards other parts of problems
- Students should also troubleshoot examples and explain misapplications of the conventions or properties.

Reference Materials

- Linear Relationships Topical Outline.docx
- Next Generation PARCC Resources
- PARCC EOY Assessment Evidence Table
- Click on the specific Standard to find Sample Tasks
- Regents Exam Questions by topic
- Math Videos By Topic
- Math Assessment Project - Tasks by Standard
- Linear Relationship Worksheets by J Thai

Verona High School / H.B. Whitehorne Algebra 1

Unit Title: Exponential Equations **Unit Duration: 1 months**	**Cross-curricular Opportunities: Banking, Biology**

Stage 1: Desired Results

Established Goals:

N.RN.1 *- Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5.*

N.RN.2 *- Rewrite expressions involving radicals and rational exponents using the properties of exponents.*

N.RN.3 *- Explain why sums and products of rational numbers are 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.*

F.IF.3 *- Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers*

F.IF.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.*

F.IF.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.

F.IF.7 *- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Exponential, growth or decay.

F.IF.9 *- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

A.REI.11 *- 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); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*

A.CED.2 *- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*

F.LE.1 *- Distinguish between situations that can be modeled with linear functions and with exponential functions.*

a. Prove that linear functions grow by equal differences over equal intervals; and that exponential functions grow by equal factors over equal intervals.

b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

F.LE.2 *- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

F.LE.5 *- Interpret the parameters in a linear or exponential function in terms of a context.*

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

a. Interpret parts of an expression, such as terms, factors and coefficients

b. Interpret complicated expressions by viewing one or more of their parts as a single entity

A.SSE.3 *- Choose and produce an equivalent form of an expression to reveal and explain the properties of the quantity represented by the expression.*

a. Factor a quadratic expression to reveal the zeros of the function it defines

b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines

c. Use the properties of exponents to transform expression for exponential functions.

F.BF.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.*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to…evaluate exponential equations using all representations to interpret real life situations

Students will understand that:

U1. Numerical outcomes may have different properties than the original numbers
U2. Exponents are repeated multiplication
U3. Exponents properties can make computation faster and easier
U4. Exponential Functions are a new family that have new properties
U5. Rational exponents can be transformed into radical expressions
U6. Exponential growth and Decay is a common real life occurrence.

Students will keep considering:

Q1. How to numbers change when you perform operations on them?
Q2. Which form of a rational exponent is best?
Q3. Is it possible for a graph never to touch the xor y axis?
Q4. What parts of your life can be explained through an exponential relationship?
Q5. How can you use the graph to find the solution of an equation?

Students will know:

K1. Rational and irrational number properties
K2. properties of exponents
K3. How to perform operations on exponents
K4. How to graph exponential functions
K5. the steps to changing radicals to exponents and exponents to radicals
K6. properties of exponential growth and decay

Students will be skilled at:

A1. Analyzing when a number or operation on a number will be rational or irrational
A2. Simplifying exponential expressions
A3. Graphing Exponential Functions
A4. Evaluating and graphing exponential growth and decay

Stage 2: Acceptable Evidence

Performance Task & Unit Assessments:

Students will show that they really understand by evidence of:

- Exponentials Test Bank
- Unit 4 Exponentials Test
  - Exponentials Test Answers
  - Exponentials Test RETAKE
  - Exponentials Test Review
    - Review Answers
  - Exponentials Mini Quiz
    - Mini Quiz Answers
- Alg 1 Exponentials Sample PARCC Questions
- People Finder Activity
- Zombie Apocalypse Activity
  - Activity Helpful Hints
  - Activity Answers
- Exponent Rules Quiz
  - Quiz Answers
  - Quiz RETAKE
  - Exponent Rules Review
    - Review Answers
- 7-6 Notes, HW and Answers
- 7-7 Notes, HW, Worksheet and Answers

Other Evidence:

Students will show that they have achieved Stage 1 goals by:

Formal:
- Providing written/oral response to the EQs
- Passing all quizzes on basic concepts in unit.

Informal:
- Simplifying expressions before moving on to more challenging parts of a problem
- Students should also troubleshoot examples and explain misapplications of the conventions or properties.

Reference Materials

- Exponentials Topical Outline
- Next Generation PARCC Resources
- PARCC EOY Assessment Evidence Table
- Click on the specific Standard to find Sample Tasks
- Regents Exam Questions by topic
- Math Videos By Topic
- Exponential Unit Outline and Resources
- Math Assessment Project - Tasks by Standard
- Exponentials Worksheets by Jon Thai
- 7-1 to 7-4 Notes
  - Teacher Notes

Verona High School / H.B. Whitehorne Algebra 1

Unit Title: Functions **Unit Duration: 2 months**	**Cross-curricular Opportunities: Physics**

Stage 1: Desired Results

Established Goals:

A.CED.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.*
A.CED.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.*
F.IF.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.*
F.IF.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.*
F.IF.6 *- Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
F.IF.7 *- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
- *a. Graph linear and quadratic functions and show intercepts, maxima, and minima.*
- *b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Exponential, growth or decay.*

F.IF.9 *- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
F.BF.1 *- Write a function that describes a relationship between two quantities.*
a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
F.BF.2 *- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
F.BF.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.*
F.LE.1 - Distinguish between situations that can be modeled with linear functions and with exponential functions.
- *a. Prove that linear functions grow by equal differences over equal intervals;*
  and that exponential functions grow by equal factors over equal intervals.
- *b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.*

F.LE.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
F.LE.3 *- Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.*
F.LE.5 *- Interpret the parameters in a linear or exponential function in terms of a context.*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to… analyze problems and, using knowledge from past units, decide which type of function is an appropriate model for each problem.

Students will understand that:

U1. Sequence formulas are common sense shortcuts
U2. Sequences are a direct result of finding patterns
U3. Rates of change can be calculated outside of linear functions
U4. Wording of a problem may be able to tell you what type of model is appropriate.
U5. The calculator can help to decide a function type.
U6. Knowledge of all prior units is necessary for this unit.

Students will keep considering:

Q1. Why is it beneficial to generalize a pattern with an equation?
Q2. What is the benefit of learning sequences and series?
Q3. How can any function have a rate of change, even if it does not have a slop?
Q4. How do you know what type of function a word problem models?

Students will know:

K1. The rules and properties of Arithmetic and Geometric sequences
K2. Rates of change of any function
K3. How to analyze all word problems
K4. The half-life formula
K5. Quadratic models that account for raising and lowering prices
K6. How to set up ratio equations
K7. Population formulas

Students will be skilled at:

A1. Analyzing arithmetic and geometric sequences
A2. Writing formulas for arithmetic and geometric sequences
A3. Calculating rates of change of ANY function over an interval
A4. choosing which type of functions a word problem represents.

Stage 2: Acceptable Evidence

Performance Task & Unit Assessments:

Students will show that they really understand by evidence of:

- Functions Test Bank
- Unit 5 - Functions Test
  - Functions Test Answers
  - Functions Test Review
    - Test Review Answers
  - Functions Test RETAKE
- 4-6 Notes, HW and Answers
- Functions PARCC Sample Questions
- Functions DeltaMath Assignments

Other Evidence:

Students will show that they have achieved Stage 1 goals by:

Formal:
- Providing written/oral response to the EQs
- Passing all quizzes on basic concepts in unit.

Informal:
- Picking out words/numbers from the problem that will help decide which type of function the model represents.
- Students should also troubleshoot examples and explain misapplications of the conventions or properties.

Reference Materials

- Functions Topical Outline
- Next Generation PARCC Resources
- PARCC EOY Assessment Evidence Table
- Click on the specific Standard to find Sample Tasks
- Regents Exam Questions by topic
- Math Videos By Topic
- Math Assessment Project - Tasks by Standard

Verona High School / H.B. Whitehorne Algebra 1

Unit Title: Descriptive Statistics **Unit Duration: 1 month**	**Cross-curricular Opportunities: Statistics**

Stage 1: Desired Results

Established Goals:

S.ID.1 *- Represent data with plots on the real number line (dot plots, histograms, and box plots).*
S.ID.2 *- Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.*
S.ID.3 *- Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).*
S.ID.5 *- Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.*
S.ID.6 *- Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.*

a. *Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.*
b. *Informally assess the fit of a function by plotting and analyzing residuals.*
c. *Fit a linear function for a scatter plot that suggests a linear association.*

S.ID.7 *- Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*
S.ID.8 *- Compute (using technology) and interpret the correlation coefficient of a linear fit.*
S.ID.9 *- Distinguish between correlation and causation.*

Transfer Goal:

Students will be able to <u>independently</u> use their learning to… manipulate and use a set of data to answer questions about current and future trends.

Students will understand that:

U1. There are many ways to organize and visually display data.
U2. You can use different measures to interpret and compare sets of data.
U3. Separating data is a good way to summarize and compare data sets.
U4. When collecting data to solve a problem, you need to make sure that your method are fair and that you accurately represent the results.

Students will keep considering:

Q1. How do you know what type of chart to use?
Q2. Which measure of central tendency best describes a set of data?
Q3. What to box and whisker plots tell you about a set of data?
Q4. How do create a good survey that will generate good results?

Students will know:

K1. How to put data into various charts
K2. Measures of central tendency
K3. Measures of Dispersion
K4. How to create box and whisker plots
K5. the difference between qualitative and quantitative
K6. how to create a good survey

Students will be skilled at:

A1. Using and making frequency tables and cumulative frequency tables
A2. Using and making histograms.
A3. Identifying outliers
A4. Analyzing data in different forms
A5. Creating Surveys and analyzing results.

Stage 2: Acceptable Evidence

Performance Task & Unit Assessments:

Students will show that they really understand by evidence of:

- Descriptive Statistics Test Bank
- Descriptive Statistics PARCC Sample Questions
- Two Way Table Project
    - Construct a Two Way Table PPT
- Descriptive Statistics Pictionary Activity
- 5-7 Notes and Activities
- 11-10 Notes and Activities
- 12-2 Notes, HW, LQ and Activity
- 12-3 Notes, HW, LQ and Activity
- 12-4 Notes, HW, Worksheets
- 12-5 Notes

Other Evidence:

Students will show that they have achieved Stage 1 goals by:

Formal:
- Providing written/oral response to the EQs
- Passing all quizzes on basic concepts in unit.

Informal:
- Students should also troubleshoot examples and explain misapplications of the conventions or properties.

Reference Materials

- Descriptive Statistics Topical Outline
- Next Generation PARCC Resources
- PARCC EOY Assessment Evidence Table
- Click on the specific Standard to find Sample Tasks
- Regents Exam Questions by topic
- Math Videos By Topic
- Math Assessment Project - Tasks by Standard