Scope and Sequence: A Pathway to Learning

Algebra 1

<table>
<tr><th>Topic/Unit</th><th colspan="2">Suggested Time Frame:</th></tr>
<tr><td>Chapter 1: Expressions and Functions</td><td>Quarter # 1</td><td>5 weeks</td></tr>
<tr><th>Priority Cluster and Standard(s):</th><th colspan="2">Supporting Standards:</th></tr>
<tr><td>A1.N-Q.A: Reason quantitatively and use units to solve problems.
● A1.N-Q.A.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, include utilizing real-world context.
A1.A-SSE.A: Interpret the structure of expressions.
● A1.A-SSE.A.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 expressions by viewing one or more of their parts as a single entity.
● A1.A-SSE.A.2 Use structure to identify ways to rewrite numerical and polynomial expressions. Focus on polynomial multiplication and factoring patterns.
A1.A-CED.A Create equations that describe numbers or relationships.
● A1.A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A1.F-IF.A Understand the concept of a function and use function notation.
● A1.F-IF.A.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).</td><td colspan="2">A1.N-RN.B: Use properties of rational and irritation numbers
● A1.N-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.
A1.N-Q.A: Reason quantitatively and use units to solve problems.
● A1.N-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. Include problem-solving opportunities utilizing real-world context.
● A1.N-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities utilizing real world context.
A1.F-IF.B Interpret functions that arise in applications in terms of the context
● A1.F-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
A1.A-REI.D Represent and solve equations and inequalities graphically.
● A1.A-REI.D.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.</td></tr>
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- **A1.F-IF.A.2** Evaluate a function for inputs in the domain, and interpret statements that use function notation in terms of a context.

A1.F-IF.B Interpret functions that arise in applications in terms of the context

- **A1.F-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. Include problem-solving opportunities utilizing real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-IF.C Analyze functions using different representation**s**

- **A1.F-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.
  Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).
- **A1.F-IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  a. Use the process of factoring and completing the square of a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Essential Question(s):

How can mathematical ideas be represented?
How do you choose appropriate levels of accuracy?
How can a decision be made about the level of accuracy needed or desired for a real-world measurement?
Why is it helpful to have several different representations of the same relation?

- Why are functions useful representations?
- Why are graphs useful representations?

Key Concept(s):	Key Vocabulary:
I can… **Minimally Proficient** ● Write verbal expressions for algebraic expressions. ***MP*** ● Write algebraic expressions for verbal expressions. ***MP*** ● Recognize the properties of equality and identity properties. ***MP*** ● Recognize the Commutative and Associative Properties. ***MP*** ● Define appropriate quantities for descriptive modeling. ***MP*** **Partially Proficient** ● Use the Distributive Property to evaluate expressions. ***PP*** ● Use the Distributive Property to simplify expressions. ***PP*** ● Represent relations. ***PP*** ● Interpret graphs of relations. ***PP*** ● Determine whether a relation is a function. ***PP*** ● Find linear equations. ***PP*** **Proficient** ● Evaluate numerical expressions by using the order of operations. ***P*** ● Evaluate algebraic expressions by using the order of operations. ***P*** ● Choose appropriate levels of accuracy. ***P*** ● Interpret intercepts and symmetry of graphs of functions. ***P*** ● Interpret positive, negative, increasing and decreasing behavior, extrema, and end behavior of graphs of functions. ***P***	● accuracy ● algebraic expression ● base ● coefficient ● coordinate system ● dependent variable ● domain ● end behavior ● exponent ● function ● independent variable ● Intercept ● like terms ● line symmetry ● metric ● ordered pair ● order of operations ● origin ● power ● range ● reciprocal ● relation ● relative maximum ● relative minimum ● simplest form ● term ● variables ● vertical line test ● end behavior

Topic/Unit	Suggested Time Frame:	
Chapter 2: Linear Equations	**Quarter # 1**	**3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-CED.A Create equations that describe numbers or relationships. ● **A1.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). ● **A1.A-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. **A1.A-REI.B** Solve equations and inequalities in one variable. ● **A1.A-REI.A.1** Explain each step in solving linear and quadratic equations 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. ● **A1.A-REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	

Essential Question(s):

Why is it helpful to represent the same mathematical idea in different ways?
Why is it helpful to represent a mathematical idea using an equation?
How can you represent mathematical relationships using ratios and proportions?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Translate sentences into equations. ***MP*** ● Translate equations into sentences. ***MP*** **<u>Partially Proficient</u>** ● Use algebra tiles to model solving equations. ***PP*** ● Solve equations by using addition and subtraction. ***PP*** ● Solve equations by using multiplication and division. ***PP*** ● Solve equations involving more than one operation. ***PP*** ● Solve equations involving consecutive integers. ***PP*** ● Compare ratios. ***PP*** ● Solve proportions. ***PP*** **<u>Proficient</u>** ● Solve equations with the variable on both sides. ***P*** ● Solve equations involving grouping symbols. ***P*** ● Evaluate absolute value expressions. ***P*** ● Solve absolute value equations. ***P***	● consecutive integers ● dimensional analysis ● equivalent equations ● extremes ● formula ● identity ● linear equation ● literal equation ● means ● multi-step equations ● number theory ● proportion ● rate ● ratio ● scale ● scale model ● solve an equation ● unit analysis ● unit rate

Topic/Unit	Suggested Time Frame:	
Ch 3: Linear and Nonlinear Functions	**Quarter # 2**	**3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.N-Q.A: Reason quantitatively and use units to solve problems. ● **A1.N-Q.A.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, include utilizing real-world context. **A1.A-CED.A** Create equations that describe numbers or relationships**.** ● **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales**.** **A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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. **A1.F-IF.B** Interpret functions that arise in applications in terms of the context ● **A1.F-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. Include problem-solving opportunities utilizing real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). ● **A1.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and	**A1.F-IF.B** Interpret functions that arise in applications in terms of the context ● **A1.F-IF.A.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

piecewise-defined functions (limited to absolute value and step).

A1.F-IF.C Analyze functions using different representation**s**

- **A1.F-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.b Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

- **A1.F-LE.A.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.

- **A1.F-LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.

A1.F-BF.A Build a function that models a relationship between two quantities.

- **A1.F-BF.A.1** Write a function that describes a relationship between two quantities. Determine an explicit expression, a recursive process, or steps for calculation from real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-BF.B Build new functions from existing functions.

- **A1.F-BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, 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. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

Essential Question(s):

Why are graphs useful?
What are the benefits of having a model for a linear function?
Why is it helpful to have different ways to graph linear functions?
What can a linear graph tell you about the relationship that it represents?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Identify linear equations, intercepts, and zero. ***MP*** ● Find the slope of a line. ***MP*** ● Recognize arithmetic sequences. ***MP*** **<u>Partially Proficient</u>** ● Graph linear equations. ***PP*** ● Use rate of change to solve problems. ***PP*** ● Write and graph linear equations in slope-intercept form. ***PP*** ● Identify and graph step functions. ***PP*** ● Identify and graph piecewise-defined functions. ***PP*** ● Identify and graph translations of absolute value functions. ***PP*** ● Identify and graph reflections and dilations of absolute value functions. ***PP*** **<u>Proficient</u>** ● Find zeros of linear functions. ***P*** ● Model linear functions. ***P*** ● Model real world data with equations in slope-intercept form. ***P*** ● Identify the effects of the graphs of linear functions by replacing f(x) with f(x) + k and f(x - h) for positive and negative values. ***P*** ● Identify the effects on the graphs of linear functions by replacing f(x) with af(x), f(ax), -af(x) and f(-ax) ***P*** ● Relate arithmetic sequences to linear functions. ***P***	● arithmetic sequence ● common difference ● constant ● constant function ● greatest integer function ● linear equation ● linear function ● piecewise-linear function ● rate of change ● root ● sequence ● slope ● slope-intercept form ● standard form ● step function ● transformations ● x-intercept ● y-intercept ● zero of a function

Topic/Unit	Suggested Time Frame:	
Chapter 4: Equations of Linear Functions	**Quarter # 2**	**2-3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.N-Q.A: Reason quantitatively and use units to solve problems. ● **A1.N-Q.A.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, include utilizing real-world context. **A1.A-CED.A** Create equations that describe numbers or relationships**.** ● **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales**.** **A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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. **A1.F-IF.B** Interpret functions that arise in applications in terms of the context ● **A1.F-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. Include problem-solving opportunities utilizing real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). ● **A1.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).	

A1.F-IF.C Analyze functions using different representations

- **A1.F-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.b Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

- **A1.F-LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.

A1.F-BF.B Build new functions from existing functions.

- **A1.F-BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, 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. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

Essential Question(s):

Why is math used to model real-world situations?
When would a linear function be used to model a real-world situation?
How can you use a set of data to make predictions?
When would the inverse of a linear function be used to model a real-world situation?

Key Concept(s):

I can…

Minimally Proficient

- Write an equation of a line in slope-intercept form given the slope and one point. ***MP***
- Write an equation of a line in slope-intercept form given two points. ***MP***
- Use lines of fit to make and evaluate predictions. ***MP***

Partially Proficient

- Investigate relationships between quantities by using points on scatter plots. ***PP***
- Write equations of lines in standard form and point-slope form. ***PP***
- Write linear equations in different forms. ***PP***

Key Vocabulary:

- association
- best-fit line
- bivariate data
- causation
- constraint
- correlation
- correlation coefficient
- inverse function
- inverse relation
- linear extrapolation
- linear interpolation
- linear regression
- line of fit
- median-fit line

● Write an equation of a line that passes through a given point, parallel to a given line. ***PP*** ● Write an equation of a line that passes through a given point, perpendicular to a given line. ***PP*** ● Write equations of best-fit lines using linear regression. ***PP*** ● Find the inverse of a relation. ***PP*** ● Find the inverse of a linear function. ***PP*** **<u>Proficient</u>** ● Distinguish between correlation and causation. ***P*** ● Draw the graph of an inverse relation by reflecting the overall graph in the line y = x. ***P***	● parallel lines ● perpendicular lines ● point-slope form ● residual ● scatter plot ● standard form

Topic/Unit	Suggested Time Frame:	
Chapter 5: Linear Inequalities	**Quarter # 2**	**2-3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-CED.A Create equations that describe numbers or relationships. ● **A1.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). **A1.A-REI.B** Solve equations and inequalities in one variable. ● **A1.A-REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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.

Essential Question(s):

How are symbols useful in mathematics?
What mathematical symbols do you know?
Why is it important to understand what the symbols in a mathematical sentence represent?
How are symbols used to write expressions, equations, and inequalities?
How are graphs helpful when solving inequalities in two variables?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Solve linear inequalities by using addition. ***MP*** ● Solve linear inequalities by using subtraction. ***MP*** ● Use algebra tiles to model and solve inequalities. ***MP*** ● Solve linear inequalities by using multiplication. ***MP*** ● Solve linear inequalities by using division. ***MP*** ● Graph linear inequalities on the coordinate plane. ***MP*** ● Solve inequalities by graphing. ***MP*** **<u>Partially Proficient</u>** ● Solve linear inequalities involving more than one operation. ***PP*** ● Solve linear inequalities involving the Distributive Property. ***PP*** ● Solve and graph absolute value inequalities (< and >) ***PP***	● boundary ● closed half-plane ● compound inequality ● half-plane ● inequality ● intersection ● open half-plane ● union

Proficient ● Solve compound inequalities containing the word and, and graph their solution set. ***P*** ● Solve compound inequalities containing the word or, and graph their solution set. ***P*** ● Use a graphing calculator to investigate the graphs of inequalities. ***P***	

Topic/Unit	Suggested Time Frame:	
Chapter 6: **Systems of Linear Equations and Inequalities**	**Quarter #** **3**	**3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-CED.A Create equations that describe numbers or relationships. ● **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ● **A1.A-CED.A.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**.** **A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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). Focus on cases where $f(x)$ and/or $g(x)$ are linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).	**A1.A-REI.C** Solve systems of equations. ● **A1.A-REI.C.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. **A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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. ● **A1.A-REI.D.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.

Essential Question(s):

How can you find the solution to a math problem?
What are the advantages of using technology to solve systems of equations?
What are the benefits of having different strategies for solving systems of equations?
What are the advantages of using matrices to solve problems?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Determine the number of solutions a system of linear equations has. ***MP*** **<u>Partially Proficient</u>** ● Solve systems of linear equations by graphing. ***PP*** ● Use a graphing calculator to graph and solve a system of equations. ***PP*** ● Solve systems of equations by using substitution. ***PP*** ● Solve systems of linear inequalities by graphing. ***PP*** ● Solve systems of equations by using elimination with addition. ***PP*** ● Solve systems of equations by using elimination with subtraction. ***PP*** ● Solve systems of equations by using elimination with multiplication. ***PP*** **<u>Proficient</u>** ● Determine the best method for solving systems of equations. ***P*** ● Apply systems of equations. ***P*** ● Use matrices to solve systems of equations. ***P*** ● Apply systems of linear inequalities. ***P*** ● Solve real-world problems involving systems of equations. ***P***	● augmented matrix ● consistent ● dependent ● dimension ● element ● elimination ● inconsistent ● independent ● matrix ● substitution ● system of equations ● system of inequalities

Topic/Unit	Suggested Time Frame:	
Chapter 7: **Exponents and Exponential Functions**	**Quarter # 3**	**3 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-SSE.A: Interpret the structure of expressions. ● **A1.A-SSE.A.2** Use structure to identify ways to rewrite numerical and polynomial expressions. Focus on polynomial multiplication and factoring patterns. **A1.A-CED.A** Create equations that describe numbers or relationships**.** ● **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales**.** **A1.A-REI.D** Represent and solve equations and inequalities graphically. ● **A1.A-REI.D.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). Focus on cases where $f(x)$ and/or $g(x)$ are linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). **A1.F-IF.B** Interpret functions that arise in applications in terms of the context ● **A1.F-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. Include problem-solving opportunities utilizing real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). **A1.F-BF.B** Build new functions from existing functions. ● **A1.F-BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, and $f(x+k)$ for specific values of k (both	**A1.N-RN.B:** Use properties of rational and irritation numbers ● **A1.N-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. **A1.F-IF.A** Understand the concept of a function and use function notation. ● **A1.F-IF.A.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

- **A1.F-LE.A.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.
  c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **A1.F-LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.

A1.F-LE.B Interpret expressions for functions in terms of the situation they model.

- **A1.F-LE.B.5** Interpret the parameters in a linear or exponential function with integer exponents utilizing real world context

Essential Question(s):

How can you make good decisions? What factors affect good decision making?
Why do you think it is important to simplify radical expressions?
How can mathematical models help you make good decisions?
Summarize the transformations produced by performing various operations on the parent exponential function.
How can being financially literate help you to make good decisions?

Key Concept(s):	Key Vocabulary:
I can… **Minimally Proficient** ● Multiply monomials using the properties of exponents. ***MP*** ● Simplify square roots by applying the Product and Quotient Properties of Square Roots. ***MP*** ● Add, subtract, and multiply radical expressions. ***MP*** ● Graph exponential functions. ***MP*** ● Identify data that display exponential behavior. ***MP*** ● Divide monomials using the properties of exponents. ***MP*** **Partially Proficient** ● Simplify expressions containing negative and zero exponents. ***PP*** ● Simplify expressions using the multiplication properties of exponents. ***PP*** ● Solve equations involving expressions with rational exponents. ***PP*** ● Write exponential functions by using a graph, a description, or two points. ***PP*** ● Identify and generate geometric sequences. ***PP*** **Proficient** ● Given the equation of an exponential function, predict how the dependent variable will change over an interval of the independent variable. ***P*** ● Evaluate and rewrite expressions involving rational exponents. ***P*** ● Identify the effects on the graphs of exponential functions by replacing f(x) with f(x) + k and negative values of h and k. ***P*** ● Identify the effects on the graphs of exponential functions by replacing f(x) with af(x) and f(ax) with positive and negative values of a. ***P*** ● Create equations and solve problems involving exponential growth and decay. ***P*** ● Transform and interpret expressions of exponential functions by applying the properties of exponents. ***P*** ● Relate geometric sequences to exponential functions. ***P*** ● Use a recursive formula to list terms in a sequence. ***P*** **Highly Proficient**	● asymptote ● common ratio ● compound interest ● conjugates ● constant ● cube root ● exponential decay ● exponential equation ● exponential function ● exponential growth ● geometric sequence ● monomial ● negative exponent ● *n*th root ● order of magnitude ● radical expression ● radical exponent ● rationalizing the denominator ● recursive formula ● zero exponent

• Write recursive formulas for arithmetic and geometric sequences. ***HP***	

Topic/Unit	Suggested Time Frame:	
Chapter 8: Polynomials	**Quarter # 4**	**3weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-SSE.A: Interpret the structure of expressions. ● **A1.A-SSE.A.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 expressions by viewing one or more of their parts as a single entity. ● **A1.A-SSE.A.2** Use structure to identify ways to rewrite numerical and polynomial expressions. Focus on polynomial multiplication and factoring patterns. **A1.A-SSE.B** Write expressions in equivalent forms to solve problems. ● **A1.A-SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.	**A1.A-APR.A** Perform arithmetic operations on polynomials. ● **A1.A-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**.** **A1.A-APR.B** Understand the relationship between zeros and factors of polynomials. ● **A1.A-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. Focus on quadratic and cubic polynomials in which linear and quadratic factors are available. **A1.A-REI.C** Solve systems of equations. ● **A1.A-REI.C.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.

Essential Question(s):

When could a nonlinear function be used to model a real-world situation?
Why would you add, subtract, or multiply equations that represent real-world situations?
What are the advantages of using quadratic expressions for modeling?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Write polynomials in standard form. ***MP*** ● Add and subtract polynomials. ***MP*** ● Multiply a polynomial by a monomial. ***MP*** ● Use algebra tiles to find the product of two binomials. ***MP*** ● Find squares of sums and differences. ***MP*** ● Find the product of a sum and a difference. ***MP***	● binomial ● degree of a monomial ● degree of a polynomial ● difference of two squares ● factoring ● factoring by grouping ● FOIL method ● leading coefficient ● perfect square trinomial

Partially Proficient ● Solve equations involving the products of monomials and polynomials. ***PP*** ● Multiply binomials by using the FOIL method. ***PP*** ● Multiply polynomials by using the Distributive Property. ***PP*** ● Factor binomials using algebra tiles and a product mat. ***PP*** ● Use the Distributive Property to factor polynomials. ***PP*** ● Factor polynomials by grouping. ***PP*** ● Use algebra tiles to factor trinomials. ***PP*** **Proficient** ● Factor trinomials of the form $x^2 + bx + c$. ***P*** ● Factor trinomials of the form $ax^2 + bx + c$. ***P*** ● Factor binomials that are the difference of squares. ***P*** ● Factor trinomials that are perfect squares. ***P***	● polynomial ● prime polynomial ● quadratic expression ● standard form of a polynomial ● trinomial

Topic/Unit	Suggested Time Frame:	
Chapter 9: **Quadratic Functions and Equations**	**Quarter #** **4**	**4 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.A-SSE.B Write expressions in equivalent forms to solve problems. ● **A1.A-SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. **A1.A-CED.A** Create equations that describe numbers or relationships**.** ● **A1.A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). ● **A1.A-CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales**.** **A1.F-IF.B** Interpret functions that arise in applications in terms of the context ● **A1.F-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. Include problem-solving opportunities utilizing real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). ● **A1.F-IF.B.6** Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step). **A1.F-IF.C** Analyze functions using different representation**s**	**A1.A-REI.B** Solve equations and inequalities in one variable. ● **A1.A-REI.B.4** Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – k)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Focus on solutions for quadratic equations that have real roots. Include cases that recognize when a quadratic equation has no real solutions. **A1.A-REI.C** Solve systems of equations. ● **A1.A-REI.C.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. ● **A1.A-REI.C.6** Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables. Include problem solving opportunities utilizing real-world context. **A1.F-LE.A** Construct and compare linear, quadratic, and exponential models and solve problems. ● **A1.F-LE.A.3** Observe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.

- **A1.F-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.b Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-BF.B Build new functions from existing functions.

- **A1.F-BF.B.3** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, 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. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).

A1.F-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

- **A1.F-LE.A.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.
  c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **A1.F-LE.A.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.

Essential Question(s):

Why do we use different methods to solve math problems?
How can the graph of a quadratic function help you to solve the corresponding quadratic equation?
How is the symmetry of the graph of a quadratic function reflected in the solutions found by completing the square?
How do you know which method to use when solving a quadratic equation?
When is it best to solve a system by graphing and when is it best to solve it by using substitution?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Identify key features of writing quadratic equations in vertex form. ***MP*** **<u>Partially Proficient</u>** ● Graph quadratic functions. ***PP*** ● Estimate solutions of quadratic equations by graphing. ***PP*** ● Solve quadratic equations by using the Square Root Property. ***PP*** ● Solve quadratic equations by factoring. ***PP*** ● Solve quadratic equations by completing the square. ***PP*** ● Solve quadratic equations by using the Quadratic Formula. ***PP*** ● Use the discriminant to determine the number of solutions of a quadratic equation. ***PP*** ● Solve systems of linear and quadratic equations by graphing. ***PP*** ● Identify linear, quadratic, and exponential functions from given data. ***PP*** **<u>Proficient</u>** ● Investigate the rate of change of a quadratic equation. ***P*** ● Solve quadratic equations by graphing. ***P*** ● Solve systems of linear and quadratic equations by using algebraic methods. ***P*** ● Write equations that model data. ***P*** ● Combine functions by using addition and subtraction. ***P*** ● Combine functions by using multiplication. ***P*** **<u>Highly Proficient</u>** Analyze the characteristics of graphs of quadratic functions. ***HP*** ● Apply translations to quadratic functions. ***HP*** ● Apply dilations and reflections to quadratic functions. ***HP***	● axis of symmetry ● completing the square ● discriminant ● double root ● maximum ● minimum ● parabola ● Quadratic Formula ● quadratic function ● standard form ● vertex ● vertex form

Topic/Unit	Suggested Time Frame:	
Chapter 10: Statistics	**Quarter # 4**	**2 weeks**

Priority Cluster and Standard(s):	Supporting Standards:
A1.S-ID.A Summarize, represent, and interpret data on a single count or measurement variable. ● **A1.S-ID.A.1** Represent real-value data with plots for the purpose of comparing two or more data sets. ● **A1.S-ID.A.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. ● **A1.S-ID.A.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of outliers if present. **A1.S-ID.B** Summarize, represent and interpret data on two categorical and quantitative variables ● **A1.S-ID.B.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. **A1.S-ID.C** Interpret linear models ● **A1.S-ID.C.8** Compute and interpret the correlation coefficient of a linear relationship.	**A1.S-CP.A Understand independence and conditional probability and use them to interpret data.** ● **A1.S-CP.A.1** Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections, or complements of other events. ● **A1.S-CP.A.2** Use the Multiplication Rule for independent events to understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ● **A1.S-ID.B.6** Represent data on two quantitative variables on a scatter plot, and describe how the quantities are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Focus on linear models. b. Informally assess the fit of a function by plotting and analyzing esiduals. ● **A1.S-ID.C.7** Interpret the slope as a rate of change and the constant term of a linear model in the context of the data. ● **A1.S-ID.C.9** Distinguish between correlation and causation.

Essential Question(s):

How are statistics used in the real world?
How can measures of center and percentile rank be used to analyze real-world data sets?

Key Concept(s):	Key Vocabulary:
I can… **<u>Minimally Proficient</u>** ● Represent sets of data by using measures of center. ***MP*** ● Represent sets of data by using percentiles. ***MP*** ● Represent data by using dot plots. ***MP*** ● Describe the shape of a distribution. ***MP*** ● Use the shapes of distribution to select appropriate statistics. ***MP*** **<u>Partially Proficient</u>** ● Determine whether a discrete or continuous graphical representation is appropriate, and then create the bar graph or histogram. ***PP*** **<u>Proficient</u>** ● Calculate measures of spread. ***P*** ● Analyze data sets using statistics. ***P*** ● Determine the effect that transformations of data have on measures of central tendency and variation. ***P*** ● Compare data using measures of central tendency and variation. ***P*** ● Summarize data in two-way frequency tables. ***P*** ● Summarize data in two-way relative frequency tables. ***P***	● bar graph ● cumulative frequency ● distribution ● dot plot ● frequency table ● histogram ● joint frequencies ● linear transformation ● marginal frequencies ● mean ● measures of center ● median ● mode ● percentile ● qualitative data ● quantitative data ● relative frequency ● skewed distribution ● standard deviation ● symmetric distribution ● two-way frequency table