Algebra 1

Proficiency Scale
Chapter 1-Expressions and Functions

Priority Cluster/State Standard

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).

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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.N-Q.A.1		**Choose** an appropriate quantity or scale in a real-world context.	**Determine** appropriate quantities or scale in a real-world context	**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	Determine, use, and **interpret** appropriate quantities or scale to solve problems in a real-world context.

				scale and the origin in graphs and data displays, include utilizing real-world context.	
A1.A-SSE.A.1		**Interpret defined linear functional relationships or expressions** in terms of a mathematical or a real world context.	**Interpret linear, quadratic, or exponential functional relationships or expressions** in terms of a mathematical or a real world context.	**Interpret, compare, and/or relate linear, quadratic, or exponential functional** relationships or expressions in terms of a mathematical or a real-world context.	**Interpret, compare, and/or relate** <u>any course appropriate functional relationships or expressions in</u> terms of a mathematical or a real world context.
A1.A-SSE.A.2		**Write equivalent <u>numerical expressions</u>** in one variable, using addition, subtraction, and multipication.	**Write equivalent <u>numerical and polynomial</u>** expressions in one variable, using addition, subtraction, and muliplication.	**Use structure** to identify ways to rewrite numerical and polynomial expressions.	**Write and analyze** equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication and factoring, including multi-step problems.
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.F-IF.A.1		Identify the domain and range of a function given in **numeric form**.	Determine the domain and range of a linear, quadratic, or exponential function given in	Determine the domain and/or range of a function **representing a real-world context.**	Determine the domain and/or range of a function representing a real-world context in problems **relating multiple**

				numeric, **graphic**, or **algebraic** form		**grade-level concepts.**
A1.F-IF.A.2		**Evaluate** functions for inputs in their domain	**Use and evaluate** functions for inputs in their domain.	Use, evaluate, and **interpret** functions for inputs in their domain in terms of real-world context.	Use, evaluate, and interpret functions for inputs in their domain that **require a complex line of reasoning**.
A1.F-IF.B.4		**Identify the properties of linear functions** represented algebraically, graphically, or numerically in tables.	**Graph linear and quadratic functions** and identify key features.	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**.	Accurately sketch graphs, showing key features, given a verbal description of the relationship, **including piecewise defined and step functions.**
A1.F-IF.C.7		**Graph or identify** the graph of a **linear** function	**Graph or identify** the graph of a **linear, exponential, or quadratic** functions.	Graph functions expressed **symbolically and show key features of the graph**, by hand in simple cases and using technology for more complicated cases.	Graph or identify the graph of any **course appropriate function** and analyze the graph.
A1.F-IF.C.8		Identify x-intercepts of a quadratic function, **given its graph.**	Graph quadratic functions using **technology and identify their roots.**	**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 in a	**Given a context, writes and analyzes** a linear or quadratic function.

				quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.	

Proficiency Scale
Chapter 2-Linear Equations

Priority Cluster/State Standard
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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-CED.A.1		**Choose** a representation that models a **linear** relationship between quantities.	**Choose a representation** that models a linear or an **exponential** relationship between quantities.	**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.	**Create mathematical representations** that model relationships between quantities **relating multiple grade-level concepts** and when prompted **use the representation** to make further decisions about mathematical and real-world problems.
A1.A-CED.A.4		Solve **linear** equations, inequalities, and systems of equations that entail little procedural demand.	Solve **quadratic** equations by factoring where the leading coefficient equals 1 and b and c are integers, by taking square roots, the quadratic formula, or graphing and solve linear equations, inequalities, and systems of equations.	**Rearrange formulas** to highlight a quantity of interest, using the same reasoning as in solving equations.	**Solve equations, inequalities, and systems of equations/inequalities**, including literal equations, that require the use of a combination of procedures, or require perseverance.

A1.A-REI.A.1		**Understand** the progression of steps given to determine a solution to a linear or quadratic equation.	**Identify the reasoning for a step in the solution process** for a linear or quadratic equation.	**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.	**Critique the reasoning used** to determine a solution.
A1.A-REI.B.3		Solve **linear** equations, inequalities, and systems of equations that entail little procedural demand.	Solve **quadratic** equations by factoring where the leading coefficient equals 1 and b and c are integers, by taking square roots, the quadratic formula, or graphing and solve linear equations, inequalities, and systems of equations.	Solve **linear equations and inequalities** in one variable, including equations with coefficients represented by letters.	**Solve equations, inequalities, and systems of equations/inequalities**, including literal equations, that require the use of a combination of procedures, or require

Proficiency Scale
Chapter 3- Linear and Nonlinear Functions

Priority Cluster/State Standard

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 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).

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.N-Q.A.1		**Choose** an appropriate quantity or scale in a real-world	**Determine** appropriate quantities or scale in a real-world	**Use** units as a way to understand problems and to guide the solution	Determine, use, and **interpret** appropriate quantities or scale

		context.	context	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.	to solve problems in a real-world context.
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.A-REI.D.10		**Recognize** that an equation in two variables relates one quantity to another.	**Identify** ordered pairs that are solutions to an equation and graph the points on a coordinate plane.	**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.	**Interpret** the solutions in terms of a mathematical or a real-world context.
A1.F-IF.B.4		Interpret the key features, in terms of a mathematical or a real-world context, of **linear** functions when given the graph.	Interpret the key features, in terms of a mathematical or a real-world context, of linear, **quadratic, or exponential functions**, when given the graph.	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**.	Interpret the key features, in terms of a mathematical or a real-world context, of **course appropriate functions.**

A1.F-IF.B.6		Interpret defined **linear** functional relationships or expressions in terms of a mathematical or a realworld context.	Interpret **linear, quadratic, or exponential** functional relationships or expressions in terms of a mathematical or a realworld context.	**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.	Interpret, calculate, **compare, and/or relate any course appropriate** functional relationships or expressions in terms of a mathematical or a realworld context.
A1.F-IF.C.7		**Graph or identify** the graph of a **linear** function	**Graph or identify** the graph of a **linear, exponential, or quadratic** functions.	Graph functions expressed **symbolically and show key features of the graph**, by hand in simple cases and using technology for more complicated cases.	Graph or identify the graph of any **course appropriate function** and analyze the graph.
A1.F-LE.A.1		**Analyze a real-world scenario** presented with a data set, to determine whether it could be **represented by a linear function**.	**Analyze a real-world scenario** presented with a data set to determine whether it could be **represented by a linear or exponential function.**	**Distinguish between** situations that can be modeled with **linear functions and with exponential functions**.	**Analyze a real-world scenario or data set** and provide an argument as to why it could be represented by a linear, quadratic, or exponential function.
A1.F-LE.A.2		Choose a representation that models a **linear** relationship between quantities.	Choose a representation that models a linear or an **exponential** relationship between quantities.	**Construct linear and exponential functions**, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.	**Create or choose mathematical representations that model relationships** between quantities relating **multiple grade-level concepts** and when prompted **use the representation to make further decisions** about mathematical and real-world

					problems.
A1.F-BF.A.1		Choose a representation that models a **linear** relationship between quantities	Choose a representation that models a linear or an **exponential** relationship between quantities.	**Write a function that describes a relationship between two quantities.** Determine an <u>explicit expression</u>, a <u>recursive process</u>, or <u>steps for calculation</u> from real-world context.	**Create or choose mathematical representations that model relationships** between quantities **relating multiple grade-level concepts** and **when prompted use the representation to make further decisions** about mathematical and real-world problems.
A1.F-BF.B.3		Select the graph of a function under a **vertical translation.**	Select the graph of a functions under a **vertical and/or a horizontal translation**.	**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.	**Select, produce, and/or analyze** the graph of a function under **one or more transformations.**

Proficiency Scale
Chapter 4- Equations of Linear Functions

Priority Cluster/State Standard

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 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.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).

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.N-Q.A.1		**Choose** an appropriate quantity or scale in a real-world context.	**Determine** appropriate quantities or scale in a real-world context	**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	Determine, use, and **interpret** appropriate quantities or scale to solve problems in a real-world context.

				and data displays, include utilizing real-world context.	
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.A-REI.D.10		**Recognize** that an equation in two variables relates one quantity to another.	**Identify** ordered pairs that are solutions to an equation and graph the points on a coordinate plane.	**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.	**Interpret** the solutions in terms of a mathematical or a real-world context.
A1.F-IF.B.4		Interpret the key features, in terms of a mathematical or a real-world context, of **linear** functions when given the graph.	Interpret the key features, in terms of a mathematical or a real-world context, of linear, **quadratic, or exponential functions**, when given the graph.	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**.	Interpret the key features, in terms of a mathematical or a real-world context, of **course appropriate functions.**
A1.F-IF.B.6		Interpret defined **linear** functional relationships or expressions in terms of a mathematical or a real world context.	Interpret **linear, quadratic, or exponential** functional relationships or expressions in terms of a mathematical or a	**Calculate** and interpret the **average rate of change** of a continuous function (presented symbolically or as	Interpret, calculate, **compare, and/or relate any course appropriate** functional relationships or expressions in

			real world context.	a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context.	terms of a mathematical or a real world context.
A1.F-IF.C.7		**Graph or identify** the graph of a **linear** function	**Graph or identify** the graph of a **linear, exponential, or quadratic** functions.	Graph functions expressed **symbolically and show key features of the graph**, by hand in simple cases and using technology for more complicated cases.	Graph or identify the graph of any **course appropriate function** and analyze the graph.
A1.F-LE.A.2		Choose a representation that models a **linear** relationship between quantities.	Choose a representation that models a linear or an **exponential** relationship between quantities.	**Construct linear and exponential functions**, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.	**Create or choose mathematical representations that model relationships** between quantities relating **multiple grade-level concepts** and when prompted **use the representation to make further decisions** about mathematical and real-world problems.
A1.F-BF.B.3		Select the graph of a function under a **vertical translation.**	Select the graph of a functions under a **vertical and/or a horizontal translation**.	**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.	**Select, produce, and/or analyze** the graph of a function under **one or more transformations.**

Proficiency Scale
Chapter 5- Linear Inequalities

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-CED.A.1		**Choose** a representation that models a **linear** relationship between quantities.	**Choose a representation** that models a linear or an **exponential** relationship between quantities.	**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.	**Create mathematical representations** that model relationships between quantities **relating multiple grade-level concepts** and when prompted **use the representation** to make further decisions about mathematical and real-world problems.
A1.A-REI.B.3		Solve **linear** equations, inequalities, and systems of equations that entail little procedural demand.	Solve **quadratic** equations by factoring where the leading coefficient equals 1 and b and c are integers, by taking square roots, the quadratic formula, or graphing and solve linear equations, inequalities, and systems of equations.	Solve **linear equations and inequalities** in one variable, including equations with coefficients represented by letters.	**Solve equations, inequalities, and systems of equations/inequalities**, including literal equations, that require the use of a combination of procedures, or require

Proficiency Scale
Chapter 6- Systems of Linear Equations and Inequalities

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).

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.A-CED.A.3		**Classify** possible solutions to a system of equations as viable or non-viable.	Given constraints **identify** solutions to a system and classify them as viable or non-viable options.	**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**.**	**Critique** effect of constraints on a real world modeling situation.
A1.A-REI.D.11		Given a graph of $y = g(x)$ and $y = f(x)$, **use integer-valued coordinates to name a point of intersection.**	**Identify** the solution(s) to $f(x) = g(x)$, where $f(x)$ and $g(x)$ are **linear functions.**	**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	**Explain why the graph of an equation in two variables** is the set of all its solutions. **Represent coincidental linear equations** as multiples of each other.

				approximately.	

Proficiency Scale
Chapter 7- Exponents and Exponential Functions

Priority Cluster/State Standard
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 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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-SSE.A.2		**Write equivalent** <u>**numerical expressions**</u> in one variable, using addition, subtraction, and multipication.	**Write equivalent** <u>**numerical and polynomial**</u> expressions in one variable, using addition, subtraction, and muliplication.	**Use structure** to identify ways to rewrite numerical and polynomial expressions.	**Write and analyze** equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication and factoring,

					including multi-step problems.
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.A-REI.D.11		Given a graph of $y = g(x)$ and $y = f(x)$, **use integer-valued coordinates to name a point of intersection.**	**Identify** the solution(s) to $f(x) = g(x)$, where $f(x)$ and $g(x)$ are **linear functions.**	**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.	**Explain why the graph of an equation in two variables** is the set of all its solutions. **Represent coincidental linear equations** as multiples of each other.
A1.F-IF.B.4		Interpret the key features, in terms of a mathematical or a real-world context, of **linear** functions when given the graph.	Interpret the key features, in terms of a mathematical or a real-world context, of linear, **quadratic, or exponential functions**, when given the graph.	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**.	Interpret the key features, in terms of a mathematical or a real-world context, of **course appropriate functions.**
A1.F-BF.B.3		Select the graph of a function under a **vertical translation.**	Select the graph of a functions under a **vertical and/or a horizontal translation**.	**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	**Select, produce, and/or analyze** the graph of a function under **one or more transformations.**

				negative); **find the value of *k* given the graphs. Experiment with cases and illustrate an explanation** of the effects on the graph.	
A1.F-LE.A.1		**Analyze a real-world scenario** presented with a data set, to determine whether it could be **represented by a linear function**.	**Analyze a real-world scenario** presented with a data set <u>to</u> determine whether it could be **represented by a linear or exponential function.**	**Distinguish between** situations that can be modeled with **linear functions and with exponential functions**.	**Analyze a real-world scenario or data set** and <u>provide an argument</u> as to why it could be represented by a linear, quadratic, or exponential function.
A1.F-LE.A.2		Choose a representation that models a **linear** relationship between quantities.	Choose a representation that models a linear or an **exponential** relationship between quantities.	**Construct linear and exponential functions**, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.	**Create or choose mathematical representations that model relationships** between quantities relating **multiple grade-level concepts** and when prompted **use the representation to make further decisions** about mathematical and real-world problems.
A1.F-LE.B.5		**Interpret defined linear functional relationships** or expressions in terms of a mathematical or a real world context.	**Interpret linear, quadratic, or exponential functional relationships** or expressions in terms of a mathematical or a real world context.	**Interpret the parameters in a linear or exponential function** with integer exponents utilizing real world context.	**Interpret, compare, and/or relate any course appropriate functional relationships** or expressions in terms of a mathematical or a real world context**.**

Proficiency Scale
Chapter 8- Polynomials

Priority Cluster/State Standard

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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-SSE.A.1	**Interpret defined linear functional relationships or expressions** in terms of a mathematical or a real world context.	**Interpret linear, quadratic, or exponential functional relationships or expressions** in terms of a mathematical or a real world context.	**Interpret, compare, and/or relate linear, quadratic, or exponential functional** relationships or expressions in terms of a mathematical or a real-world context.	**Interpret, compare, and/or relate** <u>any course appropriate functional relationships or expressions</u> in terms of a mathematical or a real world context.	**Interpret defined linear functional relationships or expressions** in terms of a mathematical or a real world context.
A1.A-SSE.A.2		**Write equivalent** <u>**numerical expressions**</u> in one variable, using addition, subtraction, and multipication.	**Write equivalent** <u>**numerical and polynomial**</u> expressions in one variable, using addition, subtraction, and muliplication.	**Use structure** to identify ways to rewrite numerical and polynomial expressions.	**Write and analyze** equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication and factoring, including multi-step problems.
A1.A-SSE.B.3		**Use the structure of simple expressions and equations** to <u>identify or produce equivalent forms</u> in situations **involving no more than two operations.**	Use the structure of simple expressions and equations to **identify or produce equivalent forms** in situations **involving more**	**Choose and produce an equivalent form of an expression** to reveal and explain properties of the quantity represented by the expression. a. **Factor a**	Use the structure of expressions and equations to **rewrite them in different forms in order** to **make generalizations and draw conclusions.**

			than two operations.	quadratic expression to reveal the zeros of the function it defines.	

Proficiency Scale
Chapter 9- Quadratic Functions and Equations

Priority Cluster/State Standard

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.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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.A-SSE.B.3		**Use the structure of simple expressions and equations** to identify or produce equivalent forms in situations	Use the structure of simple expressions and equations to **identify or produce equivalent forms**	**Choose and produce an equivalent form of an expression** to reveal and explain properties of the quantity	Use the structure of expressions and equations to **rewrite them in different forms in order** to **make generalizations**

		involving no more than two operations.	in situations **involving more than two operations.**	represented by the expression. a. **Factor a quadratic expression** to reveal the zeros of the function it defines.	**and draw conclusions.**
A1.A-CED.A.1		**Choose** a representation that models a **linear** relationship between quantities.	**Choose a representation** that models a linear or an **exponential** relationship between quantities.	**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.	**Create mathematical representations** that model relationships between quantities **relating multiple grade-level concepts** and when prompted **use the representation** to make further decisions about mathematical and real-world problems.
A1.A-CED.A.2		**Identify linear equations in one variable** to solve problems.	**Create linear equations in one variable** to solve problems; **graph equations** on coordinate axes with labels and scales.	**Create equations in two or more variables** to represent relationships between quantities; **graph equations** on coordinate axes with labels and scales.	**Create equations** in one or two variables and **use them to solve problems**. **Explain** how a created equation or inequality models a context.
A1.F-IF.B.4		Interpret the key features, in terms of a mathematical or a real-world context, of **linear** functions when given the graph.	Interpret the key features, in terms of a mathematical or a real-world context, of linear, **quadratic, or exponential functions**, when given the graph.	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	Interpret the key features, in terms of a mathematical or a real-world context, of **course appropriate functions.**

				opportunities **utilizing real-world context**.	
A1.F-IF.B.6		Interpret defined **linear** functional relationships or expressions in terms of a mathematical or a realworld context.	Interpret **linear, quadratic, or exponential** functional relationships or expressions in terms of a mathematical or a realworld context.	**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.	Interpret, calculate, **compare, and/or relate any course appropriate** functional relationships or expressions in terms of a mathematical or a realworld context.
A1.F-IF.C.7		**Graph or identify** the graph of a **linear** function	**Graph or identify** the graph of a **linear, exponential, or quadratic** functions.	Graph functions expressed **symbolically and show key features of the graph**, by hand in simple cases and using technology for more complicated cases.	Graph or identify the graph of any **course appropriate function** and analyze the graph.
A1.F-BF.B.3		Select the graph of a function under a **vertical translation.**	Select the graph of a functions under a **vertical and/or a horizontal translation**.	**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.	**Select, produce, and/or analyze** the graph of a function under **one or more transformations.**
A1.F-LE.A.1		**Analyze a real-world scenario** presented with a data set, to determine whether it could be	**Analyze a real-world scenario** presented with a data set to determine whether it could be	**Distinguish between** situations that can be modeled with **linear functions and with**	**Analyze a real-world scenario or data set** and provide an argument as to why it could be

		represented by a linear function.	represented by a linear or exponential function.	exponential functions.	represented by a linear, quadratic, or exponential function.
A1.F-LE.A.2		Choose a representation that models a **linear** relationship between quantities.	Choose a representation that models a linear or an **exponential** relationship between quantities.	**Construct linear and exponential functions**, including arithmetic and geometric sequences, given a graph, a description of a relationship, or input/output pairs.	**Create or choose mathematical representations that model relationships** between quantities relating **multiple grade-level concepts** and when prompted **use the representation to make further decisions** about mathematical and real-world problems.

Proficiency Scale
Chapter 10- Statistics

Priority Cluster/State Standard
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.

Standard	No Evidence of Proficiency 0	Minimally Proficient 1	Partially Proficient 2	Proficient 3	Highly Proficient 4
A1.S-ID.A.1		Represent data with a **dot plot.**	Represent data with plots on a number line with a **dot plot or histogram.**	**Represent** real-value data with plots for the purpose of comparing two or more data sets.	**Choose and justify** the most appropriate plot on a number line.
A1.S-ID.A.2		**Calculate a given** measure of center.	**Choose the most appropriate measure** of center of data sets, considering the shape and spread of the data.	**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.	**Choose and justify the most appropriate measures** of center and spread of the data distribution in two or more data sets.
A1.S-ID.A.3		**Identify** outliers.	Interpret the differences in shape, center, ***or*** spread in the context of the data, including the effects of outliers.	Interpret differences in shape, center, ***and*** spread in the context of the data sets, accounting for possible effects of outliers if present.	**Identify and explain** errors in inferences made based on assumptions about the data.
A1.S-ID.B.5		From a two-way table, **state** relative	Given a two-way table, **calculate** joint,	**Summarize** categorical data for two categories	**Provide evidence to show** possible associations and

		frequencies.	marginal, and conditional relative frequencies of categorical data.	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.	trends in the data.
A1.S-ID.C.8		**Distinguish between** scatter plots that show a negative correlation and scatter plots that show a positive correlation.	Identify a strong or weak correlation **given a correlation coefficient**.	**Compute and interpret** the correlation coefficient of a **linear relationship**.	Compare and contrast the strength of the fit for a **variety of functions.**