Algebra 1 Level 2

Unit 1: Expressions, Equations, and Inequalities
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- 1.2 – Equations
- 1.3 – Inequalities
- 1.4 – Absolute Value

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- 2.2 – Graphs and Their Characteristics
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Unit 3: Linear Functions
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- 3.3 – Writing Linear Functions + Parallel and Perpendicular Lines
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Unit 6: Exponential Functions
- 6.1 – Characteristics + Evaluating
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Unit 7: Quadratic Functions
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Unit 8: Statistics
- 8.1 – Data and Displays
- 8.2 – Distribution
- 8.3 – Scatterplot

1-2 Day Sections
- Sequences – Arithmetic and Geometric; Recursive and Explicit
- Number Sets – Explain why rational x rational = rational, rational x irrational = irrational
- Inverse Functions – Find inverse equation (stick in solving equations for different variables?

Unit	Section
1: Expressions, Equations, and Inequalities	1.1: Expressions
Essential Questions	**Objectives** – Students will…
▪ How can we find and analyze the relationship among numerical patterns? ▪ How can we represent numerical patterns to model real-world situations?	▪ be able to identify the parts of an expression ▪ know patterns can be represented in a number of ways ▪ know mathematical relationships exist in patterns ▪ know a rule can be generated from a pattern ▪ be able to write a mathematical expression from words and a table
Standards	**Resources**
A-SSE Seeing Structure in Expressions *A. Interpret the structure of expressions* 1. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1 + r)^n$ as the product of P and a factor not depending on P.* given that P is the principal amount of money that is growing at a rate, r, over a period of time, t, in years.	▪ 1.1 Intro to expressions – homework ▪ 1.1 Writing expressions – classwork ▪ 1.1 Writing expressions – homework ▪ 1.1 Expressions – mini-quiz ▪ 1.1 Problem Solving with expressions – assessment
Vocabulary Terms	**Writing Prompts**
▪ Coefficient ▪ Term ▪ Factor ▪ Exponent ▪ Expression ▪ Distributive Property ▪ Associative Property ▪ Commutative Property ▪ Combining Like Terms – Simplifying	▪ Are 4m and m4 equal? Justify your answer. ▪ Are 3/k and k/3 equal? Justify your answer.

Unit	Section
1: Expressions, Equations, and Inequalities	1.2: Equations
Essential Questions	**Objectives** – Students will…
▪ How can equations help us to generalize and describe patterns in our world? ▪ How can we use equations to model and solve real-world problems? ▪ How can you solve an equation?	▪ know vocabulary terms ▪ know the properties used for solving equations ▪ be able to solve 1 variable equations ▪ be able to isolate a specific variable ▪ be able to prove an equation's solution ▪ be able to write an equation to model a real-life problem
Standards	**Resources**
A-CED Creating Equations *Create equations that describe numbers or relationships.* 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. 4. Rearrange formulas to highlight a quantity of interest, using properties of equality. *For example, rearrange Ohm's law V = IR to* for the variable R. Manipulate variables in formulas used in financial contexts, such as for simple interest (I=Prt) **A-REI Reasoning with Equations and Inequalities** *A. Understand solving equations as a process of reasoning and explain the reasoning.* 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify or refute a solution method. *B. Solve equations and inequalities in one variable.* 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. MA.3.a. Solve linear equations and inequalities in one variable involving absolute value.	▪ 1.2 Solving Equations – notes + practice ▪ 1.2 Solving Equations – homework ▪ 1.2 Justification – notes (PPT) ▪ 1.2 Literal Equations – classwork ▪ 1.2 Solving Equations (all types) - homework ▪ 1.2 Solving Equations – quiz ▪ 1.2 Problem Solving with Equations – assessment
Vocabulary Terms	**Writing Prompts**
▪ Equation ▪ Solution ▪ Identity ▪ No Solution ▪ Addition Property of Equality ▪ Subtraction Property of Equality ▪ Multiplicative Property of Equality ▪ Division Property of Equality ▪ Commutative Property ▪ Distributive Property ▪ Simplify (combine like terms)	▪ Solve and prove the following equation. Be sure to check your final answer.

Unit	Section
1: Expressions, Equations, and Inequalities	1.3: Inequalities
Essential Questions	**Objectives –** Students will…
▪ How can we use inequalities to describe real-world problems? ▪ How does absolute value change the way we can use inequalities?	▪ know vocabulary terms ▪ know the effect that multiplication by a negative has on an inequality ▪ be able to solve and graph inequalities ▪ be able to write an inequality to model a real-life problem ▪ be able to solve and graph compound inequalities
Standards	**Resources**
A-CED Creating Equations *A. Create equations that describe numbers or relationships*. 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. **A-REI Reasoning with Equations and Inequalities** *Solve equations and inequalities in one variable.* 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. MA.3.a. Solve linear equations and inequalities in one variable involving absolute value.	▪ 1.3 Intro to Inequalities – homework ▪ 1.3 Solving Inequalities – notes + practice ▪ 1.3 Solving Inequalities – notes (PPT) ▪ 1.3 Solving Inequalities – homework ▪ 1.3 Inequality Word Problems – classwork ▪ 1.3 Solving Inequalities – classwork ▪ 1.3 Solving Inequalities – mini-quiz ▪ 1.3 Inequalities Word Problem Bank ▪ 1.3 Compound Inequalities – notes (PPT) ▪ 1.3 Scavenger Hunt – discovery activity ▪ 1.3 Compound Inequalities – homework ▪ 1.3 Connect Four Review Game (PPT) ▪ 1.3 Inequalities – quiz ▪ 1.3 Problem Solving with Inequalities – assessment
Vocabulary Terms	**Writing Prompts**
▪ Greater than (at least) ▪ Less than (at most) ▪ Open circle ▪ Closed circle ▪ And (intersection) ▪ Or (union) ▪ No Solution	▪ Write a real world situation in which an "and/or" compound inequality would be appropriate to use. ▪ Write a real world situation for the inequality graph shown.

Unit	Section
1: Expressions, Equations, and Inequalities	1.4: Absolute Value
Essential Questions	**Objectives** – Students will…
▪ What does absolute value represent? ▪ How does absolute value change the way we can use inequalities?	▪ know vocabulary terms ▪ be able to solve absolute value equations ▪ be able to solve absolute value inequalities ▪ be able to write an absolute value inequality to model a real-life problem
Standards	**Resources**
A-CED Creating Equations *A. Create equations that describe numbers or relationships*. 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. **A-REI Reasoning with Equations and Inequalities** *B. Solve equations and inequalities in one variable.* 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. MA.3.a. Solve linear equations and inequalities in one variable involving absolute value.	▪ 1.4 Absolute Value Equations – notes + practice ▪ 1.4 Absolute Value Equations – notes (PPT) ▪ 1.4 Absolute Value Inequalities – discovery activity ▪ 1.4 Absolute Value Inequalities - homework ▪ 1.4 Absolutes Value (all types) – homework
Vocabulary Terms	**Writing Prompts**
▪ Absolute Value ▪ Distance ▪ Direction	▪ Write a real world situation in which an absolute value inequality would be appropriate to use. ▪ Write a real world situation for the absolute value inequality graph shown. ▪ Explain in words what $\|x\| > 5$ means. Draw a picture to go with your explanation.

Unit	Section
2: Introduction to Functions	2.1: What is a Function?
Essential Questions	**Objectives** – Students will…
▪ How can you represent a function? ▪ How can you use functions to help model real world problems?	▪ be able to identify a function in multiple representations ▪ be able to create a table, mapping diagram, graph, or rule that describes a function ▪ understand that a graph is a display of all the solutions to a function ▪ understand and apply new vocabulary words ▪ be able to interpret function notation ▪ evaluate functions
Standards	**Resources**
F-IF Interpreting Functions *A. Understand the concept of a function (linear or exponential with integer exponents) and use function notation.* 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). 2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **A-REI Reasoning with Equations and Inequalities** *D. Represent and solve equations and inequalities graphically.* 10. Understand that the graph of an equation in two variables (equations include linear, absolute value, exponential) is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). Show that any point on the graph of an equation in two variables is a solution to the equation.	▪ 2.1 Intro to Functions – notes (PPT) ▪ 2.1 ID functions – classwork ▪ 2.1 Representing functions – homework
Vocabulary Terms	**Writing Prompts**
▪ function ▪ input/output ▪ domain/range ▪ graph ▪ mapping diagram ▪ function notation	▪ What is a function? Give an example in the representation of your choice. ▪

Unit	Section
2: Introduction to Functions	2.2: Graphs and Characteristics
Essential Questions	**Objectives** – Students will…
▪ How can we graph any function? ▪ What is the real world meaning of _____ of a function? (intercepts, max/min, inc/dec)	▪ know vocabulary terms ▪ graph functions from tables ▪ identify the characteristics of a function ▪ identify the domain and range of a function
Standards	**Resources**
F-IF Interpret functions *B. Interpret functions that arise in applications in terms of the context. (include linear, quadratic, and exponential functions with integer exponents).* 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior.* 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. 6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. *C. Analyze functions using different representations (include linear, quadratic, and exponential functions with integer exponents).* 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. using different representations. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph piecewise-defined functions, including step functions and absolute value functions. e. Graph exponential functions, including step functions and absolute value functions	▪ 2.2 Characteristics of functions – notes + examples ▪ 2.2 Characteristics of functions – notes (PPT) ▪ 2.2 Representations of relations – graphic organizer ▪ 2.2 Characteristics of Functions – homework ▪ 2.2 Domain and Range – homework
Vocabulary Terms	**Writing Prompts**
▪ Linear function ▪ Quadratic function ▪ Exponential function ▪ Absolute Value function ▪ Piecewise function ▪ Step function ▪ Domain/Range ▪ Intercepts (x and y) ▪ Maximum/Minimum ▪ Increasing/Decreasing ▪ Symmetry ▪ End Behavior	▪ What does the term "parent function" mean?

Unit	Section
2: Introduction to Functions	2.3: Translations
Essential Questions	**Objectives** – Students will…
▪ How can we use an equation to help us graph a function using rules of translations? ▪	▪ know vocabulary terms ▪ recognize and apply translations to parent functions (shifts, stretch/shrinks) ▪ calculate the k value of a function from a graph
Standards	**Resources**
F-BF Building Functions *B. Build new functions from existing functions (using linear, quadratic, and exponential functions).* 3. Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Utilize technology to experiment with cases and illustrate an explanation of the effects on the graph.	▪ 2.3 Translation – notes (PPT) ▪ 2.3 Translations – classwork ▪ 2.3 Translations – homework
Vocabulary Terms	**Writing Prompts**
▪ Vertical shift ▪ Horizontal shift ▪ Vertical stretch/shrink ▪ Horizontal stretch/shrink ▪ Reflection	▪ Identify the translation in the function ▪ Apply the translation to the graph ▪ Calculate the k value for a function from the graph

Unit	Section
3: Linear Functions	3.1: Slope, Characteristics, Forms, Vocabulary
Essential Questions	**Objectives –** Students will…
▪ What are the characteristics of a linear function? ▪ How can we use linear functions to model real world situations?	▪ Be able to calculate the slope of a linear function in multiple forms (graphs, points, tables) ▪ Be able to identify the characteristics of a linear function (intercepts, domain/range, increasing/decreasing/constant) ▪ Be able to identify the form of a linear equation ▪ Be able to change the form of an equation
Standards	**Resources**
A-REI Reasoning with Equations and Inequalities *D. Represent and solve equations and inequalities graphically.* 10. Understand that the graph of an equation in two variables (equations include linear, absolute value, exponential) is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). Show that any point on the graph of an equation in two variables is a solution to the equation. **F-IF Interpret Functions** *B. Interpret functions that arise in applications in terms of the context. (include linear, quadratic, and exponential functions with integer exponents).* 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. that arise in applications in terms of the context. 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. 6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	▪ 3.1 Intro to Slope and Linear Functions – notes + practice ▪ 3.1 Intro to Slope and Linear Functions – notes (PPT) ▪ 3.1 Linear Functions and Form Jumping – notes + practice
Vocabulary Terms	**Writing Prompts**
▪ Slope ▪ Rate of Change ▪ Delta Δ ▪ Linear Function ▪ Slope-Intercept Form ▪ Standard Form ▪ Point-Slope Form ▪ Undefined Slope ▪ Negative Slope ▪ Positive Slope ▪ Zero Slope ▪ Constant	▪ Find and explain the rate of change of a real world situation. ▪ Describe an appropriate domain for a real world situation. ▪ Explain how 3 different equations could all represent the same line.

Unit	Section
3: Linear Functions	3.2: Graphing Linear Functions
Essential Questions	**Objectives** – Students will…
▪ What are the characteristics of a linear function? ▪ How can we use linear functions to model real world situations?	▪ Be able to graph a linear function from an equation.
Standards	**Resources**
A-CED Creating Equations *A. Create equations that describe numbers or relationships.* 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A-REI Reasoning with Equations and Inequalities** *D. Represent and solve equations and inequalities graphically.* 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) **F-BF Building Functions** *B. Build new functions from existing functions (using linear, quadratic, and exponential functions).* 4. Find inverse functions a. Find the inverse of a linear function both graphically and algebraically	▪ 3.2 Graphing Linear Functions – classwork
Vocabulary Terms	**Writing Prompts**
▪ Slope ▪ y-intercept ▪ Vertical line **x = #** ▪ Horizontal line **y = #**	▪ Explain to an absent student how to graph an equation in slope-intercept form. ▪ Explain how to use the slope two ways.

Unit	Section
3: Linear Functions	3.3: Writing Linear Functions + Parallel and Perpendicular Lines
Essential Questions	**Objectives –** Students will…
▪ What are the characteristics of a linear function? ▪ How can we use linear functions to model real world situations?	▪ Be able to write a linear function equation from a set of points. ▪ Be able to write a linear equation from a graph. ▪ Be able to write a linear equation from a table. ▪ Be able to write a linear equation of a parallel or perpendicular line.
Standards	**Resources**
A-CED Creating Equations *A. Create equations that describe numbers or relationships.* 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. 3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	▪ 3.3 Writing Equations from a Graph – notes + practice ▪ 3.3 Parallel and Perpendicular Lines – notes + practice ▪ 3.3 Parallel and Perpendicular Lines – homework
Vocabulary Terms	**Writing Prompts**
▪ Slope-Intercept form ▪ Parallel Lines ▪ Perpendicular Lines ▪ Opposite Reciprocals	▪ Using equations, how can you determine if lines are parallel or perpendicular?

Unit	Section
3: Linear Functions	3.4: Word Problems
Essential Questions	**Objectives –** Students will…
▪ What are the characteristics of a linear function? ▪ How can we use linear functions to model real world situations?	▪ Be able to interpret the slope and y-intercept in context of the problem. ▪ Be able to solve real world problems involving linear functions. ▪ Be able to use the graphing calculator to find solutions to real world problems.
Standards	**Resources**
A-NQ Quantities *A. Reason quantitatively and use units to solve problems*. 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-SSE Seeing Structure In Expressions** *B. Write expressions in equivalent forms to solve problems.* 3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression **A-CED Creating Equations** *A. Create equations that describe numbers or relationships.* 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. 3. Represent constraints by linear equations or inequalities, and by systems of linear equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* **A-FBF Building Functions** *A. Build a function that models a relationship between two quantities.* 1. Write linear, quadratic, and exponential functions that describe a relationship between two quantities.	▪ 3.4 Linear Functions and Word Problems on the Calculator – notes + practice ▪ 3.4 Linear Functions and Word Problems on the Calculator – notes (PPT) ▪ 3.4 Linear Function Word Problems – assessment
Vocabulary Terms	**Writing Prompts**
▪ Context ▪ Units	▪ Explain a situation where you would need to restrict the domain. ▪ What would be an appropriate domain be for a real world situation?

Unit	Section
3: Linear Functions	3.5: Linear Inequalities
Essential Questions	**Objectives –** Students will…
▪ How can you use inequalities to model real world situation? ▪ Why inequalities and not equations?	▪ Be able to interpret the solution of a linear inequality ▪ Be able to graph linear inequalities on the graphing calculator.
Standards	**Resources**
A-REI Reasoning with Equations and Inequalities *D. Represent and solve equations and inequalities graphically* 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	▪ 3.5 Graphing Linear Inequalities – notes + practice
Vocabulary Terms	**Writing Prompts**
▪ Dashed line ▪ Solid Line ▪ Solution	▪ What is the difference between a dashed line and a solid line? ▪ Is (x, y) a solution to (inequality), explain why or why not?

Unit	Section
4: Systems of Linear Functions	4.1: What is System of Equations?
Essential Questions	**Objectives –** Students will…
▪ How can we solve for more than 1 unknown? ▪ How much information do I need?	▪ Be able to identify a system of equations. ▪ Be able to identify a solution of a system of equations. ▪ Be able to verify the solution to a system of equations. ▪ Be able to solve a system of equations by graphing. (by hand and on calculator)
Standards	**Resources**
A-CED Creating Equations *A. Create equations that describe numbers or relationships* 3. Represent constraints by linear equations or inequalities, and by systems of linear equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. **A-REI Reasoning with Equations and Inequalities** *D. Represent and solve equations and inequalities graphically* 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 and make tables of values.	▪ 4.1 Systems of Equations – notes + practice ▪ 4.1 Systems of Equations – notes + practice ▪
Vocabulary Terms	**Writing Prompts**
▪ System of Equation ▪ Solution to a System ▪ Intersection ▪ No Solution ▪ Infinitely Many Solutions ▪ Ordered Pair	▪ What is a solution to a system of equations graphically? And algebraically? ▪ Show and explain if (x, y) is a solution to a system. ▪ What does infinitely many solutions mean?

Unit	Section
4: Systems of Linear Functions	4.2: Solving a System Algebraically
Essential Questions	**Objectives –** Students will…
▪ How are graphs and equations related? ▪ What kind of problem can we solve using systems?	▪ Be able to solve a system of equations algebraically. (substitution/elimination) ▪ Be able to solve systems of equations word problems.
Standards	**Resources**
A-REI Reasoning with Equations and Inequalities *C. Solve systems of equations.* 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. 6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **A-NQ Quantities** *A. Reason quantitatively and use units to solve problems*. 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	▪ 4.2 Solving Systems by Substitution – notes (PPT) ▪ 4.2 Solving Systems by Substitution – notes + practice ▪ Tortious and the Hare Project – assessment
Vocabulary Terms	**Writing Prompts**
▪ Substitution ▪ Isolate ▪ Elimination ▪ Additive Inverse	▪ Find and explain the error in the work. ▪ Show or explain that a point in the solution to a system of equations.

Unit	Section
4: Systems of Linear Functions	4.3: Systems of Inequalities
Essential Questions	**Objectives –** Students will…
▪ How do you model real world situations with inequalities? ▪ How do you define real world problems with systems?	▪ Be able to graph a system of inequalities. ▪ Be able to identify points in the solutions to a system of inequalities.
Standards	**Resources**
A-REI Reasoning with Equations and Inequalities *D. Represent and solve equations and inequalities graphically* 12. Graph the solutions of 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 of a system of linear inequalities in two variables as the intersection of the corresponding half-planes **A-NQ Quantities** *A. Reason quantitatively and use units to solve problems*. 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	▪ 4.3 Linear Inequalities Systems – assessment ▪ Treasure Map Project – assessment
Vocabulary Terms	**Writing Prompts**
▪ Dashed Line ▪ Solid Line ▪ Solution Set	▪ Show that there are multiple solutions graphically and algebraically. ▪ Is (x, y) a solution to the system? Show and interpret the point.

Unit	Section
5: Polynomials and Exponents	5.1: Rules of Exponents
Essential Questions	**Objectives –** Students will…
▪ How can we model operations with exponents? ▪ What does an exponent represent?	▪ Be able to identify the parts of a term with exponents ▪ Be able to simplify expressions that have exponents ▪ Be able to evaluate expressions with exponents
Standards	**Resources**
N-RN The Real Number System *A. Extend the properties of exponents to rational exponents*. 1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})\ 3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^{3}$ must equal 5. 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	▪ 5.1 Rules of Exponents – notes + practice ▪ 5.1 Rules of Exponents – notes (PPT) ▪ 5.1 Rules of Exponents – homework ▪ 5.1 Rules of Exponents – mini-quiz ▪ I have…Who has? – review activity ▪ Speed Dating: Exponents – review activity ▪ 5.1 Rules of Exponents – quiz
Vocabulary Terms	**Writing Prompts**
▪ Exponent ▪ Base ▪ Power	▪ Find and explain the error made in the work. ▪ Show/explain the multiplication rule for exponents.

Unit	Section
5: Polynomials and Exponents	5.2: Naming and Basic Operations with Polynomials
Essential Questions	**Objectives –** Students will…
▪ How do we talk about polynomials? ▪ Can we combine unknown quantities?	▪ Be able to name a polynomial by the degree and by terms ▪ Be able to perform basic operations (+, -, x) on polynomials
Standards	**Resources**
A-APR Arithmetic with Polynomials and Rational Expressions *A. Perform arithmetic operations on polynomials.* 1. Understand that polynomials form a system analogous to the integers, namely, they are closed under certain operations. a. Perform operations on polynomial expressions (addition, subtraction, multiplication), and compare the system of polynomials to the system of integers when performing operations.	▪ 5.2 Vocab Sheet – notes ▪ 5.2 Operations with Polynomials – notes + practice + homework ▪ 5.2 Naming and Operations with Polynomials – activity
Vocabulary Terms	**Writing Prompts**
▪ Polynomial ▪ Degree ▪ Monomial ▪ Binomial ▪ Trinomial ▪ Constant ▪ Linear ▪ Quadratic ▪ Cubic ▪ Quartic ▪ Degree of n	▪ Is a binomial + binomial, always a binomial? Give an example to support your answer. ▪ Can you have a linear trinomial?

Unit	Section
5: Polynomials and Exponents	5.3: Factoring Polynomials
Essential Questions	**Objectives –** Students will…
▪ What are factors? ▪ What is the relationship between factors and products?	▪ Be able to factor polynomials using GCFs ▪ Be able to factor quadratic trinomials.
Standards	**Resources**
A-SSE Seeing Structure in Expressions *A. Interpret the structure of linear, quadratic, and exponential expressions with integer exponents* 2. Use the structure of an expression to identify ways to rewrite it. For example, see $(x + a)^2 – b^2$ as a difference of squares that can be factored as $(x + a + b)(x + a – b)$. *B. Write expressions in equivalent forms to solve problems.* 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 **A-APR Arithmetic with Polynomials and Rational Expressions** *A. Perform arithmetic operations on polynomials.* 1. Understand that polynomials form a system analogous to the integers, namely, they are closed under certain operations. b. Factor and/or expand polynomial expressions, identify and combine like terms, and apply the Distributive property	▪ 5.3 Factoring GCF – notes + practice ▪ 5.3 Factoring GCF – homework ▪ 5.3 Factoring Quadratic Polynomials – notes + practice ▪ 5.3 Factoring Quadratic Polynomials – homework
Vocabulary Terms	**Writing Prompts**
▪ Greatest Common Factor ▪ Quadratic Form ▪ Difference of Two Perfect Squares ▪ Perfect Square Trinomial ▪ Prime	▪ Is a binomial x binomial always a trinomial? Support your answer with an example. ▪ Can you write a quadratic binomial as a trinomial? ▪ What is a prime polynomial?

Unit	Section
6: Exponential Functions	6.1: Characteristics + Evaluating
Essential Questions	**Objectives –** Students will…
▪ What is an exponential relationship?	▪ Be able to identify an exponential function. ▪ Be able to identify the domain and range of an exponential function ▪ Be able to identify parts of the function ▪ Be able to evaluate an exponential function
Standards	**Resources**
F-IF Interpret functions *B. Interpret functions that arise in applications in terms of the context* 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior. **F-LE Linear, Quadratic, and Exponential Models** *A. Construct and compare linear, quadratic, and exponential models and solve problems.* 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. 3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically **F-LE Linear, Quadratic, and Exponential Models** *B. Interpret expressions for functions in terms of the situation they model.* 5. Interpret the parameters in a linear or exponential function (of the form f(x) = bx + k) in terms of a context.	▪ Pay It Forward – lesson hook ▪ Paper Folding – exploratory activity ▪ 6.1 Exponential Functions – notes + practice ▪ 6.1 Exponential Functions – homework ▪ 6.1 Exponential Functions – mini-quiz
Vocabulary Terms	**Writing Prompts**
▪ Exponential Function ▪ Power ▪ Exponent ▪ Base ▪ Intercepts ▪ Increasing/Growth ▪ Decreasing/Decay ▪ Evaluate	▪ Is the relation exponential? Explain your answer. ▪ Explain to an absent student how to get the y-intercept from an exponential equation.

Unit	Section
6: Exponential Functions	6.2: Interpreting Equations and Graphs
Essential Questions	**Objectives** – Students will…
▪ How are equations and graphs related? ▪ How can we use exponents to model real life situations?	▪ Be able to write an equation from a word problem ▪ Be able to write an equation from a graph ▪ Be able to solve real world problems involving
Standards	**Resources**
A-SSE Seeing Structure in Expression *B. Write expressions in equivalent forms to solve problems.* 3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression c. Use the properties of exponents to transform expressions for exponential functions **A-CED Creating Equations** *A. Create equations that describe numbers or relationships.* 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. **A-REI Reasoning with Equations and Inequalities** *D. Represent and solve equations and inequalities graphically* 11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, absolute value, and exponential functions. **F-IF Interpret functions** *C. Analyze functions using different representations.* 8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = $(1.02)^t$, y = $(0.97)^t$, y = $(1.01)^{12t}$, and y = $(1.2)^{t/10}$, and classify them as representing exponential growth or decay. Apply to financial situations such as Identify appreciation/depreciation rate for the value of a house or car sometime after its initial purchase. ($V_n = P(1 + r)^n$). **A-NQ Quantities** *A. Reason quantitatively and use units to solve problems*. 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-FBF Building Functions** *A. Build a function that models a relationship between two*	▪ 6.2 Exponential Function Word Problems – notes + practice ▪ 6.2 Exponential Functions - homework ▪ Exponential Functions Drug Dosage – assessment

quantities. 1. Write linear, quadratic, and exponential functions that describe a relationship between two quantities.	
Vocabulary Terms	**Writing Prompts**
▪ Starting Value (a) ▪ Rate of growth/decay (b) ▪ Interest ▪ Principle	▪ How can you tell from an equation whether the exponential function is a growth or decay relationship?

Unit	Section
7: Quadratic Functions	7.1: What is a Quadratic Function?
Essential Questions	**Objectives** – Students will…
▪ How can we model real world problems with Quadratic functions? ▪ How can we restrict the domain to make our model fit the real world?	▪ Be able to determine if a relation is a quadratic function from multiple representations ▪ Be able to identify the parts of a quadratic function graph ▪ Be able to correctly use and interpret new vocabulary terms ▪ Be able to identify the parts of a quadratic function equations
Standards	**Resources**
F-IF Interpret Functions *B. Interpret functions that arise in applications in terms of the context.* 4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior.	
Vocabulary Terms	**Writing Prompts**
▪ Quadratic Function ▪ $y = Ax^2 + Bx + C$ (where $A \neq 0$) ▪ Parabola ▪ Vertex ▪ Vertex Form ▪ Standard Form ▪ Intercept Form ▪ Axis of Symmetry ▪ x-intercept ▪ y-intercept ▪ Solution to a quadratic equation ▪ Zeros ▪ Roots	▪

Unit	Section
7: Quadratic Functions	7.2: Graphing
Essential Questions	**Objectives** – Students will…
▪ How do the characteristics of Quadratic functions relate to the context of a situation?	▪ Be able to graph a quadratic function from the equation ▪ Be able to identify characteristics of the graph ▪ Be able to use the graph to answer real world questions ▪ Be able to correctly use the interpret new vocabulary terms
Standards	**Resources**
F-IF Interpreting Functions *C. Analyze functions using different representations.* 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. using different representations. a. Graph linear and quadratic functions and show intercepts, maxima, and minima	
Vocabulary Terms	**Writing Prompts**
▪ Corresponding points ▪ Symmetric ▪ Vertex	▪

Unit	Section
7: Quadratic Functions	7.3: Solving
Essential Questions	**Objectives** – Students will…
▪ What is the solution of a Quadratic function? ▪ When is it best to use which method?	▪ Be able to solve a quadratic equations by factoring. ▪ Be able to solve a quadratic equations by Quadratic Formula. ▪ Be able to solve a quadratic equations by using square roots. ▪ Be able to solve by graphing (on a calculator)
Standards	**Resources**
A-SSE Seeing Structure in Expressions *B. Write expressions in equivalent forms to solve problems.* 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. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **A-REI Reasoning with Equations and Inequalities** *B. Solve equations and inequalities in one variable* 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 $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions **F-IF Analyze functions** *C. Analyze functions using different representations.* 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 in a quadratic function to show zeros, maximum/minimum extreme values, and symmetry of the graph, and interpret these in terms of a context.	
Vocabulary Terms	**Writing Prompts**
▪ Factoring ▪ Zero Product Property ▪ Completing the Square ▪ Roots ▪ Zeros ▪ Solutions	▪

Unit	Section
7: Quadratic Functions	7.4: Word Problems + Quad/Linear Systems
Essential Questions	**Objectives** – Students will…
▪ How can we model real world situations with Quadratic Functions?	▪ Be able to solve real world problems that involve quadratic equations.
Standards	**Resources**
A-SSE Seeing Structure in Expressions *B. Write expressions in equivalent forms to solve problems.* 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 **A-CED Creating Equations** *A. Create equations that describe numbers or relationships.* 1. Create equations and inequalities in one variable to represent a given context and use them to solve problems. Include equations arising from linear and quadratic functions, and exponential functions. **A-REI Reasoning with Equations and Inequalities** *C. Solve systems of equations.* 7. Solve a simple system consisting of a linear equation and a quadratic Represent and solve equations and inequalities equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the parabola $y = x^2 + x$ **A-NQ Quantities** *A. Reason quantitatively and use units to solve problems.* 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-FBF Building Functions** *A. Build a function that models a relationship between two quantities.* 1. Write linear, quadratic, and exponential functions that describe a relationship between two quantities.	
Vocabulary Terms	**Writing Prompts**
▪ Context ▪ Units	▪

Unit	Section
8: Statistics	8.1: Data and Displays
Essential Questions	**Objectives** – Students will…
▪ What type of data do you have? ▪ What type of display is appropriate for your data?	▪ Determine the type of data they have ▪ Be able to create and read displays of categorical data. ▪ Be able to create and read displays of quantitative data.
Standards	**Resources**
S-ID Interpreting Categorical and Quantitative Data *A. Summarize, represent, and interpret data on a single count or measurement variable.* 1. Represent data with plots on the real number line (dot plots, histograms, and box plots) *B. Summarize, represent, and interpret data on two categorical and quantitative variables.* 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.	
Vocabulary Terms	**Writing Prompts**
▪ Categorical Data ▪ Frequency Table ▪ Relative ▪ Joint Frequency ▪ Marginal Frequency ▪ Conditional Frequency ▪ Bar Grpah ▪ Pie Chart ▪ Quantitative Data ▪ Histogram ▪ Stem-and-Leaf Plot ▪ Box Plot ▪ Dot Plot	▪

Unit	Section
8: Statistics	8.2: Distribution
Essential Questions	**Objectives –** Students will…
▪ How are the measures of central tendency related to the shape of the data?	▪ Be able to find summary statistics from a set of data. ▪ Be able to determine the most appropriate summary statistics. ▪ Be able to describe the distribution of quantitative data
Standards	**Resources**
S-ID Interpreting Categorical and Quantitative Data *A. Summarize, represent, and interpret data on a single count or measurement variable.* 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. 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points	
Vocabulary Terms	**Writing Prompts**
▪ Shape (symmetric, skewed) ▪ Center (mean, median, mode) ▪ Spread (standard deviation, IQR)	▪

Unit	Section
8: Statistics	8.3: Scatterplots
Essential Questions	**Objectives** – Students will…
▪ How can we model real world data with linear regression models?	▪ Be able to create a scatterplot ▪ Be able to describe the association of two variables.
Standards	**Resources**
S-ID Interpreting Categorical and Quantitative Data *B. Summarize, represent, and interpret data on two categorical and quantitative variables.* 6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use linear functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. *C. Interpret linear models.* 7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. 8. Compute (using technology) and interpret the correlation coefficient of a linear fit. 9. Distinguish between correlation and causation.	
Vocabulary Terms	**Writing Prompts**
▪ Correlation	▪

Unit	Section
	Comparing To Other Functions
Essential Questions	**Objectives** – Students will…
▪ Which model is best to use?	▪ Compare linear, quadratic, and exponential functions. ▪ Compare the characteristics of each function
Standards	**Resources**
F-LE Linear, Quadratic, and Exponential Models *A. Construct and compare linear, quadratic, and exponential models and solve problems.* 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. 3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, or quadratically **F-IF Interpret functions** *C. Analyze functions using different representations.* 9. Translate among different representations of functions: graphs, equations, point sets, and tables. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	
Vocabulary Terms	**Writing Prompts**
▪	▪

Unit	Section
	Series and Sequences
Essential Questions	**Objectives** – Students will…
▪ How can we model patterns with equations?	▪ Write equations that model sequences. ▪ Find nth terms in sequences
Standards	**Resources**
F-BF Building Functions *A. Build a function that models a relationship between two quantities* 1. Write linear, quadratic, and exponential functions that describe a relationship between two quantities. *a. Determine an explicit expression, a recursive process, or steps for calculation from a context.* *b. Combine standard function types using arithmetic operations.* *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **F-IF Interpreting Functions** *A. Understand the concept of a function (linear or exponential with integer exponents) and use function notation.* 3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n + 1) = f(n) + f(n - 1)$ for $n \geq 1$.	
Vocabulary Terms	**Writing Prompts**
▪	▪