BPS Algebra 1 Planning Guide

1st Semester - Unit 1: Relationships with Quantities and Reasoning with Equations

Objectives
The student will be able to:

- Work with linear & exponential expressions
  - Need to be able to identify, interpret, & explain parts of expressions & write in an equivalent form.
  - Use units as a way to understand problems and guide solutions of multi-step problems (ex: Dimensional Analysis)
- Create/Solve Equations
  - 1-variable
  - 2-variable (graph these)
  - Literal equations with basic 4 operations
  - Need to be able to identify, interpret, & explain parts of equations
- Show multiple representations using PETS
  (Pictures, Equations, Tables, Story Problems)
- Work with rational exponents & exponential functions including positive, negative, and fractional exponents (ex: ½, ¼, etc.)

Essential Questions

- How can inverse operations be used to solve multi-step equations and inequalities?
- How is solving an inequality similar and/or different than solving an equation?
- How can multiple representations of the same problem be useful?
- How can the Law of Exponents help you rewrite an exponential expression so that it has a single base with a positive exponent?
- How do you interpret solutions to equations and inequalities as viable or not?

Mathematical Practices
1: Make sense of problems and persevere in solving them.
2: Reason abstractly and quantitatively.
4: Model with mathematics.
5: Use appropriate tools strategically.
6: Attend to precision.
7: Look for and make use of structure.
8: Look for and express regularity in repeated reasoning.

Montana Core Standards

Unit 1A Module 1: Relationships Between Quantities

N.Q.1, N.Q.2, N.Q.3

N.Q.1: Use units as a way to understand problems from a variety of contexts (e.g., science, history & culture), including those of Montana American Indians, and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

N.Q.2: Define appropriate quantities for the purpose of descriptive modeling.

N.Q.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Unit 1A Module 2: Exponents & Real Numbers

N.RN.1, N.RN.2, N.RN.3

N.RN.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation from radicals in terms of rational exponents.

N.RN.2: Rewrite expressions involving ~~radicals and~~ rational exponents using the properties of exponents.

****N.RN.3:** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

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Unit 1A Module 3: Expressions
A.SSE.1, A.SSE.2, N.Q.1, N.Q.2
A.SSE.1: Interpret expressions that represent a quantity in terms of its context. **A.SSE.1a:** Interpret parts of an expression, such as terms, factors, and coefficients. **A.SSE.1b:** Interpret complicated expressions by viewing one or more of their parts as a single entity.
****A.SSE.2:** Use the structure of an expression to identify ways to rewrite it.
N.Q.1: Use units as a way to understand problems from a variety of contexts (e.g., science, history & culture), including those of Montana American Indians, and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N.Q.2: Define appropriate quantities for the purpose of descriptive modeling.
Unit 1B Module 4: Equations & Inequalities in One Variable
N.Q.2, A.CED.1, A.CED.3, A.CED.4, A.REI.1, A.REI.3
N.Q.2: Define appropriate quantities for the purpose of descriptive modeling.
A.CED.1: Create equations and inequalities in one variable and use them to solve problems from a variety of contexts (e.g., science, history, & culture), including those of Montana American Indians. Include equations arising from linear and ~~quadratic functions, simple rational and~~ exponential functions.
A.CED.3: Represent constraints by equations or inequalities, ~~and by systems of equations and/or inequalities~~, and interpret solutions as viable or nonviable options in a modeling context.
A.CED.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
A.REI.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Unit 1B Module 5: Equations in Two Variables and Functions
A.CED.2, A.REI.10, A.REI.11, F.IF.1, F.IF.2, F.IF.3, F.IF.5, F.BF.1, F.BF.2
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.REI.10: Understand the graph of an equation in two variables is the set of all solutions plotted in the coordinate plane, often forming a curve (which could be a line).
****A.REI.11:** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solution of the equations f(x) = g(x); find the solutions approximately, e.g., using technology to graph functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, ~~polynomial, rational, absolute value,~~ exponential, ~~and logarithmic~~ functions.

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****F.IF.1:** Understand that a function from one set (called the domain) to the other 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 equations *y = f(x)*.
****F.IF.2:** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notations in terms of a context.
****F.IF.3:** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of integers.
****F.IF.5:** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
F.BF.1: Write a function that describes a relationship between two quantities.
****F.BF.2:** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations from a variety of contexts (e.g., science, history, and culture), including those from the Montana American Indian, and translate between the two forms.

1st Semester - Unit 2: Linear and Exponential Relationships

Objectives

The student will be able to:

- Write and graph linear equations in Standard, Slope-Intercept, and Point-Slope Forms
- Solve systems of equations and inequalities
  - Algebraically (substitution & elimination methods)
  - Graphically (make sure to show inequality constraints)
- Identify key features of a function
  - Is it a function?
  - Domain, range, notation, evaluate
  - End behavior, intercepts, increase/decrease intervals
- Determine if a function represents exponential growth or decay
- Use and write sequences
  - Recursive vs. Explicit
  - Arithmetic is the same as linear, Geometric is the same as exponential
- Transform a function from the parent function

Essential Questions

- Which features are highlighted in each of the forms of a linear equation?
- How does the solution set of a system of equations differ from the solution set of a system of inequalities?
- Using function notation, how do you determine the dependent and independent variables?
- What key features help you determine if a function is exponential growth or decay?
- What is the relationship between Arithmetic and Geometric sequences and Linear and Exponential functions?
- What is the difference between Explicit and Recursive Formulas?
- Given a transformed equation, describe similarities and differences between the parent and the transformed function.
- What is the slope of a given line and how do you find it both graphically and algebraically?

Mathematical Practices

1: Make sense of problems and persevere in solving them.
2: Reason abstractly and quantitatively.
3: Construct viable arguments and critique the reasoning of others.
4: Model with mathematics.
5: Use appropriate tools strategically.
6: Attend to precision.
7: Look for and make use of structure.
8: Look for and express regularity in repeated reasoning.

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Montana Core Standards
Unit 2A Module 6: Linear Functions
A.CED.2, A.REI.1, F.IF.4, F.IF.6, F.IF.7, F.IF.9, F.BF.3, F.LE.2, F.LE.5
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.REI.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
****F.IF.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums or minimums; symmetries; end behavior, ~~and periodicity~~.
F.IF.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
****F.IF.7:** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated ones. ****F.IF.7a:** Graph linear ~~and quadratic~~ functions and show intercepts, ~~maxima, and minima~~.
****F.IF.9:** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
****F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ~~Include recognizing even and odd functions from their graphs and algebraic expression for them~~.
****F.LE.2:** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
****F.LE.5:** Interpret parameters in a linear or exponential function in terms of a context.
Unit 2A Module 7: Building Linear Functions
A.CED.2, A.REI.12, F.BF.1, F.BF.2, F.BF.4
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
****A.REI.12:** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersections of the corresponding half-planes.
F.BF.1: Write a function that describes a relationship between two quantities. ****F.BF.1a:** Determine an explicit expression, a recursive process, or steps for calculation from a context. ****F.BF.1b:** Combine standard function types using arithmetic operations. This involves transformation of a function.

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F.BF.2: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations from a variety of contexts (e.g., science, history, and culture), including those from the Montana American Indian, and translate between the two forms.
****F.BF.4:** Find inverse functions. ****F.BF.4a:** Solve an equation of the form *f(x) = c* for a simple function *f* that has an inverse and write an expression for the inverse.
Unit 2A Module 8: Modeling with Linear Functions
S.ID.6, S.ID.7, S.ID.8, S.ID.9
S.ID.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ****S.ID.6a:** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. ****S.ID.6b:** Informally assess the fit of a function by plotting and analyzing residuals. **S.ID.6c:** Fit a linear function for a scatter plot that suggests a linear association.
S.ID.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
****S.ID.8:** Compute (using technology) and interpret the correlation coefficient of a linear fit.
****S.ID.9:** Distinguish between correlation and causation.
Unit 2A Module 9: Systems of Equations and Inequalities
A.CED.2, A.CED.3, A.REI.5, A.REI.6, A.REI.12
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.3: Represent constraints by equations or inequalities, ~~and by systems of equations and/or inequalities~~, and interpret solutions as viable or nonviable options in a modeling context.
A.REI.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A.REI.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 intersections of the corresponding half-planes.
Unit 2B Module 10: Exponential Functions and Equations
A.CED.1, A.SSE.3, F.BF.3, F.IF.8, F.LE.1, F.LE.2, F.LE.5
A.CED.1: Create equations and inequalities in one variable and use them to solve problems from a variety of contexts (e.g., science, history, & culture), including those of Montana American Indians. Include equations arising from linear and ~~quadratic functions, simple rational and~~ exponential functions.

A.SSE.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
A.SSE.3c: Use the properties of exponents to transform expressions for exponential functions.

F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ~~Include recognizing even and odd functions from their graphs and algebraic expression for them~~.

F.IF.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
** F.IF.8b:** Use the property of exponents to interpret expressions for exponential functions.

F.LE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.
F.LE.1c: Recognize situations which a quantity grows or decays by a constant percent rate per unit interval relative to another.

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

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

Unit 2B Module 11: Modeling with Exponential Functions

F.LE.1, F.LE.3, S.ID.6

F.LE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.
F.LE.1a: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
F.LE.1b: Recognize situations in which a quantity changes at a constant rate per unit interval relative to another.
F.LE.1c: Recognize situations which a quantity grows or decays by a constant percent rate per unit interval relative to another.

F.LE.3: Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, ~~quadratically, or (more generally) as a polynomial function~~.

S.ID.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
S.ID.6a: Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
S.ID.6b: Informally assess the fit of a function by plotting and analyzing residuals.

End of 1st Semester

2nd Semester - Unit 3: Statistics & Data

Objectives	**Essential Questions**

The student will be able to:
● Create and analyze frequency tables
  ○ Joint, marginal, conditional frequency
● Create and analyze histograms, box plots, & dot plots
● Determine mean, median, mode, interquartile range, standard deviation, and outliers
● Create and analyze scatterplots
  ○ Line of fit
  ○ Interpret rate of change and intercepts
  ○ Trends
  ○ Correlation (+, -, no correlation) and causation
  ○ Calculate correlation & residuals
	● How can you use the two-way table to determine the probability of a conditional event?
	● How can you describe the data's shape, center and spread by looking at histograms, boxplots, and dotplots?
	● What is the difference between the range and the interquartile range of a data set?
	● What are the possible effects an outlier can have on shape, center, and spread of a data set?
	● What guidelines make a line of good fit?
	
	Mathematical Practices
	1: Make sense of problems and persevere in solving them.
	2: Reason abstractly and quantitatively.
	3: Construct viable arguments and critique the reasoning of others.
	4: Model with mathematics.
	5: Use appropriate tools strategically.
	7: Look for and make use of structure.
	8: Look for and express regularity in repeated reasoning.

Montana Core Standards

Module 12: Descriptive Statistics

S.ID.5

****S.ID.5:** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

Module 13: Data Displays

S.ID.1, S.ID.2, S.ID.3

S.ID.1: Represent data with plots on the real number line (dot plots, histograms, and boxplots).

****S.ID.2:** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

****S.ID.3:** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

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2nd Semester - Unit 4: Polynomial Expressions & Equations	

Objectives
The student will be able to:
● Define and interpret polynomials
  ○ Factors
  ○ Coefficients
  ○ Degree
  ○ Terms
● Factor Quadratics
  ○ Find zeroes
  ○ GCF
  ○ Difference of squares
  ○ Regrouping
  ○ Guess & Test is also an option
● Work with operations with polynomials (include Closure)
● Create/Solve/Graph quadratic equations in Standard, Vertex, and Intercept Forms
● Analyze quadratic functions
● Solve quadratic equations
  ○ Square roots
  ○ Factoring
  ○ Quadratic Formula using the discriminant
  ○ Completing the square
● Solve quadratic systems
  ○ Graphically and algebraically
● Analyze the effect of parameters on quadratics
	Essential Questions
	● How does factoring a quadratic predict its x-intercepts?
	● How do the parameters of a quadratic equation (a, b, c, degree) affect the graph?
	● Which features are highlighted in each of the forms of a quadratic equation?
	● How does the discriminant predict the number of solutions?
	● How does the concept of combining like terms work as it relates to operations with polynomials?
	● What is the relationship of the Distributive Property and the concept of factoring out a common factor from an expression?
	
	Mathematical Practices
	1: Make sense of problems and persevere in solving them.
	2: Reason abstractly and quantitatively.
	3: Construct viable arguments and critique the reasoning of others.
	4: Model with mathematics.
	5: Use appropriate tools strategically.
	6: Attend to precision.
	7: Look for and make use of structure.
	8: Look for and express regularity in repeated reasoning.

Montana Core Standards	
Module 14: Polynomials & Operations	
A.SSE.2, A.APR.1	
A.SSE.2: Use the structure of an expression to identify ways to rewrite it.	
****A.APR.1:** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	
Module 15: Factoring Polynomials	
A.SSE.2, A.SSE.3	
A.SSE.2: Use the structure of an expression to identify ways to rewrite it.	
A.SSE.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	

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Module 16: Solving Quadratic Equations

A.SSE.3, A.REI.4, A.REI.7, F.IF.8

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

- ****A.SSE.3a:** Factor a quadratic expression to reveal the zeroes of the function it defines.
- ****A.SSE.3b:** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

****A.REI.4:** Solve quadratic equations in one variable.

- ****A.REI.4a:** 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.
- ****A.REI.4b:** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriated to the initial form of the equation. ~~Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers *a* and *b*.~~

****A.REI.7:** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

F.IF.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

- ****F.IF.8a:** Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

2nd Semester - Unit 5: Functions & Modeling

Objectives

The student will be able to:

- Work with rational and irrational numbers
  - Informal proofs
- Compare quadratic functions to linear & exponential functions
- Calculate rate of change of a function
- Compare/Contrast graphs of functions
  - Linear
  - Exponential
  - Quadratic
- Write a function in different, equivalent forms
- Compare properties of 2 functions
  - Graphically
  - Algebraically
  - Verbally
  - Numerical (table)
- Write functions to model a relationship between two quantities
- Compare linear, exponential, and quadratic functions

Essential Questions

- Given a representation (PETS), how can you determine which family the function belongs to?

Mathematical Practices

1: Make sense of problems and persevere in solving them.
2: Reason abstractly and quantitatively.
3: Construct viable arguments and critique the reasoning of others.
4: Model with mathematics.
5: Use appropriate tools strategically.
6: Attend to precision.
7: Look for and make use of structure.
8: Look for and express regularity in repeated reasoning.

Montana Core Standards
Module 17: Quadratic Functions
A.CED.2, A.REI.11, F.IF.4, F.IF.7, F.BF.3, F.LE.3
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.REI.11: Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solution of the equations f(x) = g(x); find the solutions approximately, e.g., using technology to graph functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, ~~polynomial, rational, absolute value,~~ exponential, ~~and logarithmic~~ functions.
F.IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetries; end behavior; ~~and periodicity~~.
F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology in more complicated cases. **F.IF.7a:** Graph linear and quadratic functions and show intercepts, maxima, and minima. ****FIF.7e:** Graph exponential ~~and logarithmic~~ functions, showing intercepts and end behavior, ~~and trigonometric functions, showing period, midline, and amplitude~~.
F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ~~Include recognizing even and odd functions from their graphs and algebraic expression for them~~.
F.LE.3: Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, ~~quadratically, or (more generally) as a polynomial function~~.
Module 18: Piecewise and Absolute Value Functions
A.CED.2, F.IF.7, F.BF.3
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology in more complicated cases. ****F.IF.7b:** Graph piecewise-defined functions, including step functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ~~Include recognizing even and odd functions from their graphs and algebraic expression for them~~.
Module 19: Square Root & Cube Root Functions

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A.CED.2, F.IF.7, F.IF.9, F.BF.3
A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology in more complicated cases. **F.IF.7b:** Graph piecewise-defined functions, including step functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F.IF.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ~~Include recognizing even and odd functions from their graphs and algebraic expression for them~~.
End of 2nd Semester

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