Math Learning Targets

Algebra

Unit 1

Extend the properties of exponents to rational exponents.

MGSE9-12.N.RN.2 (Properties of rational & irrational numbers)

- K1: I can rewrite a radical expression as a rational exponent. (*Limited to square roots)*
- K2: I can rewrite a rational exponent as a radical expression. (*Limited to square roots*)

Use properties of rational and irrational numbers.

MGSE9-12.N.RN.3 (Properties of rational & irrational numbers)

- K1: I can find the sums and products of rational and irrational numbers.
- R1: I can explain why rational numbers are closed under addition and multiplication.

Reason quantitatively and use units to solve problems.

MGSE9-12. N.Q.1 (Reason quantitatively & use units to solve problems)

- K1: I can calculate unit conversions.

MGSE9-12. N.Q.1a (Reason quantitatively & use units to solve problems)

- K1: I can recognize units given or needed to solve problems.

MGSE9-12. N.Q.1b (Reason quantitatively & use units to solve problems)

- R1: I can choose appropriate units to represent a problem when using formulas or graphing.

MGSE9-12. N.Q.1c (Reason quantitatively & use units to solve problems)

- R1: I can solve multi-step problems using conversion formulas.

MGSE9-12. N.Q.2 (Reason quantitatively & use units to solve problems)

- R1: I can determine appropriate quantities for the purpose of descriptive modeling.

MGSE9-12. N.Q.3 (Reason quantitatively & use units to solve problems)

- K1: I can identify appropriate units of measurement to report quantities.
- R1: I can identify and use important quantities in a problem or real-world context.

Interpret the structure of expressions

MGSE9-12.A.SSE.1 (Interpret expressions in context)

- R1: I can interpret an expression in context.

MGSE9-12.A.SSE.1a & 1b (Interpret formulas & expressions in context)

- R1: I can interpret parts of an expression such as terms, factors, and coefficients given a context or situation.

Perform arithmetic operations on polynomials

MGSE9-12.A.APR.1 (Add, subtract & multiply polynomials)

- R1: I can apply the arithmetic operations of addition, subtraction, and multiplication to polynomials.

Unit 2

Create equations that describe numbers or relationships

MGSE9-12.A.CED.1 (Create equations & inequalities in one variable)

- K1: I can solve linear equations in one variable.
- K2: I can solve inequalities in one variable.
- R1: I can create equations and inequalities in one variable from a given context and use them to solve problems.

MGSE9-12.A.CED.2 (Linear equations in two or more variables)

- K1: I can graph one or more created equations on coordinate axes with appropriate labels and scales.
- R1: I can justify which quantities are dependent or independent of each other in mathematical problems and real-world contexts.

MGSE9-12.A.CED.3 (Represent constrains with equations, inequalities, and systems)

- R1: I can determine when a problem can be represented by equations, inequalities, systems of equations, and/or inequalities.

MGSE9-12.A.CED.4 (Rearrange formulas to highlight a quantity of interest)

- R1: I can rearrange formulas to highlight a quantity of interest using the same reasoning as solving an equation.

Understand solving equations as a process of reasoning and explain the reasoning

MGSE9-12.A.REI.1 (Justify one-solution equations)

- R1: I can choose the appropriate method to solve an equation.

MGSE9-12.A.REI.3 (Solve linear and inequalities in one variable)

- K1: I can solve equations and inequalities in one variable.
- R1: I can solve equations and inequalities with coefficients represented by letters.

Solve systems of equations

MGSE9-12.A.REI.5 (Show and explain elimination)

- K1: I can solve a system of equations using elimination.
- R1: I can justify that the elimination method works when solving a system of equations.

MGSE9-12.A.REI.6 (Solve systems of linear equations)

- R1: I can solve a system of linear equations using approximation and exact methods.

Represent and solve equations and inequalities graphically

MGSE9-12.REI.10 (Connecting graphs & solutions of equations)

- K1: I can graph an equation with two variables.
- R1: I can explain why each point on a curve/line a solution to an equation is.

MGSE9-12.REI.11 (Show f(x)=g(x) using graphs, tables, or successive approximations)

- K1: I can use function notation to represent equations and inequalities.
- R1: I can explain why the intersection of f(x)=g(x) is the solution for these equations.

MGSE9-12.REI.12 (Graph solution set to linear inequality in 2 variables)

- K1: I can identify the characteristics of a linear inequality in two variables.
- R1: I can explain the intersection of the shaded regions in a system of linear inequalities.
- R2: I can graph a boundary line and shade the appropriate region in a system of linear inequalities.

Build a function that models a relationship between two quantities

MGSE9-12.F.BF.1 (Write a function)

- R1: I can write a function that describes a relationship between two quantities.

MGSE9-12.F.BF.1a (Explicit expression & recursive process)

- K1: I can define "explicit expression" and "recursive process."
- R1: I can write an explicit expression and the recursive process (steps for calculation) from context.

MGSE9-12.F.BF.2 (arithmetic sequences)

- K1: I can identify and generate arithmetic sequences from explicit and recursive formulas.
- R1: I can determine the recursive rule and the explicit formula given an arithmetic sequence.
- R2: I can translate between the recursive rule and the explicit formula using arithmetic sequences.

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 (Input vs. output)

- K1: I can identify the domain and range and determine if a relation is a function.
- K2: I can evaluate a function given values for x using proper notation.

MGSE9-12.F.IF.2 (Function notation)

- K1: I can identify mathematical relationships and express those using function notation.
- R1: I can interpret statements that use functions in terms of real-world situations. (*Linear and exponential*)

MGSE9-12.F.IF.3 (Sequences & functions)

- K1: I can recognize that sequences are functions whose domain is a subset of integers.

Interpret functions that arise in applications in terms of the context.

MGSE9-12.F.IF.4 (Key characteristics of functions)

- K1: I can define and recognize the key features in tables and graphs of linear and exponential functions.
- K2. I can identify if the function is linear or exponential.
- R1: I can interpret and sketch a function using the key features from tables, graphs, and verbal descriptions.

MGSE9-12.F.IF.5 (Domain)

- K1: I can identify and describe the domain of a function.
- R1: I can explain why a domain is appropriate for a given function.

MGSE9-12.F.IF.6 (Rate of change)

- K1: I can calculate and estimate the average rate of change over a specified interval. (*Linear and exponential*)
- R1: I can identify the average rate of change over a specified interval.

Analyze functions using different representations.

MGSE9-12.F.IF.7 (Graph linear functions)

- K1: I can graph a function by hand and using technology based on key features.

MGSE9-12.F.IF.7a (Characteristics of linear functions)

- R1: I can graph linear and quadratic functions showing intercepts, maxima, and minima.

MGSE9-12.F.IF.9 (Compare properties of linear functions)

- R1: I can use a variety of function representations to compare and contrast properties of two functions.

Unit 3

Interpret the structure of expressions

MGSE9-12.A.SSE.2 (Equivalent forms of expressions)

- R1: I can use the structure of an expression to identify ways to rewrite it.
- R2: I can identify expressions and develop strategies to assist in classification.

Write expressions in equivalent forms to solve problems

MGSE9-12. A.SSE.3 (Equivalent form of expressions)

- K1: I can choose and produce equivalent forms of an expression.
- R1: I can reveal and explain properties of a quantity represented by an expression.

MGSE9-12. A.SSE.3a (Factor quadratic to reveal zeroes)

- K1: I can factor any quadratic expression revealing the zeros of the function.

MGSE9-12.A.SSE.3b (Completing the square)

- K1: I can complete the square in a quadratic expression revealing the maximum or minimum value of the function.

Create equations that describe numbers or relationships.

MGSE9-12.A.CED.1 (Create quadratic equations to solve problems)

- K1: I can solve quadratic equations.
- R1: I can create quadratic equations and use them to solve problems.

MGSE9-12.A.CED.2 (Quadratic equations in 2 variables)

- K1: I can graph quadratic equations on a coordinate axes with appropriate labels and scales.
- R1: I can create at least two equations in two or more variables to represent relationships between quantities.

MGSE9-12.A.CED.4 (Rearrange formulas to highlight a quantity of interest)

- R1: I can rearrange formulas to highlight a quantity of interest using the same reasoning as solving an equation.

Solve equations and inequalities in one variable

MGSE9-12.A.REI.4 (Solve quadratics in one variable)

- K1: I can solve quadratic equations in one variable.

MGSE9-12.A.REI.4a (Completing the square)

- R1: I can derive the quadratic formula by completing the square on a quadratic equation in x.

MGSE9-12.A.REI.4b (Solve quadratics by inspection)

- K1: I can solve quadratics by inspection using the appropriate method.
- R1: I can recognize when the quadratic formula gives complex solutions.

Build a function that models a relationship between two quantities

MGSE9-12.F.BF.1 (Write a function explaining relationship between two quantities)

- R1: I can write a function that describes a relationship between two quantities.

Build new functions from existing functions

MGSE9-12.F.BF.3 (Write a function & build new functions)

- K1: I can identify the effect on a graph given a single transformation on a function. (*By hand or using technology*)
- R1: I can describe the differences and similarities between the parent function the transformed function.
- R2: I can find the value of k given the parent function and the transformed function.
- R3: I can recognize even and odd functions from their graphs and from their equations.

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 (Input vs. output)

- K1: I can identify the domain and range and determine if a relation is a function.

MGSE9-12.F.IF.2 (Function notation)

- K1: I can identify mathematical relationships and express those using function notation.
- R1: I can interpret statements that use functions in terms of real-world situations. (*Quadratics*)

Interpret functions that arise in applications in terms of the context

MGSE9-12.F.IF.4 (Key characteristics of functions)

- K1: I can define and recognize the key features in tables and graphs of quadratic functions.
- K2. I can identify if the function is linear, exponential or quadratic.
- R1: I can interpret and sketch a function using the key features from tables, graphs, and verbal descriptions.

MGSE9-12.F.IF.5 (Domain)

- K1: I can identify and describe the domain of a function.
- R1: I can explain why a domain is appropriate for a given function.

MGSE9-12.F.IF.6 (Average rate of change)

- K1: I can calculate and estimate the average rate of change over a specified interval. (*Emphasis on quadratics*)
- K2: I can determine the average rate of change over a specified interval.

Analyze functions using different representations

MGSE9-12.F.IF.7 (Graph quadratic functions)

- K1: I can graph a function by hand and using technology based on key features.

MGSE9-12.F.IF.7a (Characteristics of linear functions)

- R1: I can graph linear and quadratic functions showing intercepts, maxima, and minima.

MGSE9-12.F.IF.8 (Equivalent forms of functions)

- K1: I can identify different forms of a quadratic expression.
- K2: I can write functions in equivalent forms using the process of factoring.
- R1: I can interpret equivalent forms of a function defined by an expression in terms of a context.

MGSE9-12.F.IF.8a (Factoring & completing the square to show zeroes, extremes and symmetry)

- K1: I can identify zeros, extreme values, and symmetry of the graph of a quadratic function.
- R1: I can use the process of factoring and completing the square to identify key features of a quadratic function.

MGSE9-12.F.IF.9 (Compare properties of quadratic functions)

- R1: I can use a variety of function representations to compare and contrast properties of two functions.

Unit 4

Create equations that describe numbers or relationships

MGSE9-12.A.CED.1 (Create equations & inequalities in one variable)

- K1: I can solve linear equations in one variable.
- K2: I can solve inequalities in one variable.
- R1: I can create equations and inequalities in one variable and use them to solve problems.

MGSE9-12.A.CED.2 (Exponential equations in two or more variables)

- K1: I can graph one or more created exponential equations on a coordinate axes with appropriate labels and scales.
- R1: I can justify which quantities are dependent or independent of each other in mathematical problems and real-world contexts.

Build a function that models a relationship between two quantities

MGSE9-12.F.BF.1 (Write a function explaining relationship between two quantities)

- R1: I can write a function that describes a relationship between two quantities.

MGSE9-12.F.BF.1a (Explicit expression & recursive process)

- K1: I can define “explicit expression” and “recursive process”
- R1: I can write an explicit expression and the recursive process (steps for calculation) from context.

MGSE9-12.F.BF.2 (Geometric sequences)

- K1: I can identify and generate geometric sequences from explicit and recursive formulas.
- R1: I can determine the recursive rule and the explicit formula given a geometric sequence.
- R2: I can translate between the recursive rule and the explicit formula using geometric sequences.

Build new functions from existing functions

MGSE9-12.F.BF.3 (Write a function & build new functions)

- K1: I can identify the effect on a graph given a single transformation on a function. (*By hand or technology*)
- R1: I can describe the differences and similarities between parent function and transformed function.
- R2: I can recognize even and odd functions from their graphs and from their equations.

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 (Input vs. output)

- K1: I can identify the domain and range and determine if a relation is a function.
- K2: I can evaluate a function given values for x using proper notation.

MGSE9-12.F.IF.2 (Function notation)

- K1: I can identify mathematical relationships and express those using function notation.
- R1: I can interpret statements that use functions in terms of real-world situations. (*Linear and exponential*)

Interpret functions that arise in applications in terms of the context

MGSE9-12.F.IF.4 (Key characteristics of functions)

- K1: I can define and recognize the key features in tables and graphs of linear and exponential functions.
- K2. I can identify if the function is linear or exponential.
- R1: I can interpret and sketch a function using the key features from tables, graphs, and verbal descriptions.

MGSE9-12.F.IF.5 (Domain)

- K1: I can identify and describe the domain of a function.
- R1: I can explain why a domain is appropriate for a given function.

MGSE9-12.F.IF.6 (Average rate of change)

- K1: I can calculate and estimate the average rate of change over a specified interval. (*Linear and exponential*)
- K2: I can determine the average rate of change over a specified interval.

Analyze functions using different representations

MGSE9-12.F.IF.7 (Graph exponential functions)

- K1: I can graph an exponential function by hand and using technology based on key features.

MGSE9-12.F.IF.7e (Graph key features of exponential functions)

- K1: I can graph exponential functions showing intercepts and end behavior.

MGSE9-12.F.IF.9 (Compare properties of exponential functions)

- R1: I can use a variety of function representations to compare and contrast properties of two functions.

Units 5

Construct and compare linear, quadratic, and exponential models and solve problems

MGSE9-12.F.LE.1 (Linear vs exponential)

- R1: I can distinguish between situations modeling linear and exponential equations.

MGSE9-12. F.LE.1a (Growth of linear v. exponential functions)

- R1: I can prove that linear functions grow by equal differences over equal intervals.
- R2: I can prove that exponential functions grow by equal factors over equal intervals.

MGSE9-12. F.LE.1b (Constant rate per unit)

- K1: I can recognize situations when a quantity changes at a constant rate per unit.

MGSE9-12. F.LE.1c (Growth or decay by constant percent rate per unit)

- K1: I can recognize situations when a quantity grows or decays at a constant percent rate per unit.

Construct and compare linear, quadratic, and exponential models and solve problems

MGSE9-12.F.LE.2 (Linear vs. Exponential; Arithmetic vs. Geometric)

- R1: I can determine by using mathematical information if it represents a linear or exponential function.

MGSE9-12.F.LE.3 (Changes in rate and relating to context)

- K1: I can define the concept of “end behavior”.
- R1: I can compare tables and graphs of linear and exponential functions.

Interpret expressions for functions in terms of the situation they model

MGSE9-12.FLE.5 (Interpret parameters)

- R1: I can interpret the parameters in a linear or exponential function in terms of a context.

Build new functions from existing functions

MGSE9-12.F.BF.3 (Build new functions)

- K1: I can identify the effect on a graph given a single transformation on a function. (*By hand or technology*)
- R1: I can describe the differences and similarities between a parent function and a transformed function.
- R2: I can recognize even and odd functions from their graphs and from their equations.

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 (Input vs. output)

- K1: I can identify the domain and range and determine if a relation is a function.
- K2: I can evaluate a function given values for x using proper notation.

MGSE9-12.F.IF.2 (Function notation)

- K1: I can identify mathematical relationships and express those using function notation.
- R1: I can interpret statements that use functions in terms of real-world situations.

Interpret functions that arise in applications in terms of the context

MGSE9-12.F.IF.4 (Characteristics)

- K1: I can define and recognize the key features in tables and graphs of linear, exponential, and quadratic functions.
- K2. I can identify if the function is linear, exponential, or quadratic.
- R1: I can interpret and sketch a function using the key features from tables, graphs, and verbal descriptions.

MGSE9-12.F.IF.5 (Domain)

- K1: I can identify and describe the domain of any function.
- R1: I can explain why a domain is appropriate for a given function.

MGSE9-12.F.IF.6 (Rate of change)

- K1: I can calculate and estimate the average rate of change over a specified interval. (*Linear, exponential, and quadratic*)
- R1: I can identify the average rate of change over a specified interval.

Analyze functions using different representations

MGSE9-12.F.IF.9 (Compare functions)

- R1: I can use a variety of function representations to compare and contrast properties of two functions.

Unit 6

Summarize, represent, and interpret data on a single count or measurement variable

MGSE9-12.S.ID.1 (Dot plots, histograms & box plots)

- K1: I can represent data with plots on the real number line.

MGSE9-12.S.ID.2 (Compare data distribution)

- R1: I can choose the appropriate measure for center and spread based on the shape of a data distribution.
- R2: I can use appropriate statistics for center and spread to compare two or more data sets.

MGSE9-12.S.ID.3 (Shape, center & spread)

- R1: I can interpret the shape, center, and spread in the context of data sets.
- R2: I can describe the possible effects that outliers can have on the shape, center, and spread of a data set.

Summarize, represent, and interpret data on two categorical and quantitative variables

MGSE9-12.S.ID.5 (Relative Frequencies)

- K1: I can recognize and calculate the joint, marginal, and relative frequencies.
- K2: I can summarize data for two categories in two-way frequency tables.
- R1: I can interpret relative frequencies in the context of the data.
- R2: I can recognize associations and trends in the data.

MGSE9-12.S.ID.6 (Bivariate data)

- R1: I can represent data on two quantitative variables on a scatter plot and describe the relationship.

MGSE9-12.S.ID.6a (Fit a function to data)

- K1: I can fit a given function (linear, exponential, & quadratic) to data.
- R1: I can determine which function best models a scatter plot and describe the relationship.
- R2: I can use functions fitted to data to solve problems in the context of the data.

MGSE9-12.S.ID.6c (Function of best fit)

- R1: I can fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models

MGSE9-12.S.ID.7 (Rate of change; Constant term)

- R1: I can interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

MGSE9-12.S.ID.8 (Technology with correlation coefficient)

- K1: I can define the correlation coefficient.
- K2: I can calculate the correlation coefficient using technology.
- R1: I can interpret the correlation coefficient of a linear fit as a measure of how well the data fit the relationship.

MGSE9-12.S.ID.9 (Slope, correlation coefficient, causation & correlation)

- K1: I can define positive, negative, and no correlation.
- K2: I can explain why correlation does not imply causation.
- R1: I can distinguish between correlation and causation.