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Standards Based Map

9th Grade Math I

Timeline	NxG Standard(s)	Student I Can Statement(s) / Learning Target(s)	Essential Questions	Academic Vocabulary	Strategies / Activities	Resources / Materials	Assessments	Notes / Self - Reflection
	M.1HS.LER.1 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). M.1HS.LER.2 explain why	I can express a solution as an ordered pair. I can explain why the x-coordinates of the intersection are solutions. I can approximate solutions. I can use tools to solve	How can you decide what type of sequence or function is represented? How can you represent an exponential function? How do you create an appropriate function to model data or situations given	Equation Variable Coordinate-Plane Solutions Set Linear Graph X-Coordinate Y-Coordinate Intersection Inequality	Modeling Vocabulary Development Foldables Presentations	Math 1 Unit Utah State BOE Stained Glass Project Linear Programming Help Funky Furniture (linear programming activity)		

	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 M.1HS.LER.3 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 I half-planes	systems of equations. I can graph solutions to a linear inequality in two variables as a half plane. I can graph solutions to a system of linear inequalities in two variables as the intersection of half-planes.	within context? What new information will be revealed if this equation is written in a different but equivalent form?			Exponential Functions Activity		

	M.1HS.LER.4 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). M.1HS.LER.5 use function notation, evaluate functions for inputs in their domains and interpret statements that use	I can explain the difference between domain and range. I can understand that each element of the domain has exactly one element of the range. I can explain that the graph of f is the graph of the equation y=f(x). I can assign letters other than f to label and organize separate functions. I can recognize how the input of a function corresponds to its output. I can use function notation to describe	What are various representations of a function and how can they be interpreted? How do you identify and explain the key features of a function in relation to the context? How do you compare functions and their properties including maxima, minima, domain, range, intercepts, symmetry, end behavior and average rate of change?	Equation Variable Function F(x) Graph Domain Range Y=f(X) Notation Problem Input Output	Peer groups Journals Foldables	Domain and Range Matching Activity Mathematics vision cK12.org WVDE Math 1 Unit		

	function notation in terms of a context.	data. I can understand how function notation applies to real-world problems.						
	M.1HS.LER.6 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 ≥ 1. M.1HS.LER.7 for a function that models a relationship between two quantities, interpret key features of graphs and tables in terms	I can analyze a sequence and create a function whose domain is a subset of the integers. I can analyze a sequence and generate additional integers according to the function. I can determine any element of a sequence y inputing its position into a formula. I can interpret functions as they arise in real-world applications.	How can you decide what type of sequence or function is represented? What are the different ways you can represent an exponential function? How do you create an appropriate function to model data or situations given within context? What new information will be revealed if this equation is written in a different but equivalent form?	Equation Variable Function F(X) Graph Domain Range y-f(x) Notation Problem Input Output Sequence Integer Subset X intercept Y intercept Decreasing intervals Relative maximums Positive end behavior Ordered pairs Positive intervals Relative minimums Negative end behavior Increasing	Journals Essays/WACs	WVDE Math 1 Unit Exponential Activity		

	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.	I can interpret features of graphs and tables in terms of quantities for a function that models a relationship. I can recognize key information in written problems as components of a function and sketch a graph that conveys this information and indicates the key features of the function.		intervals Negative intervals Symmetries Periodicity				

	M.1HS.LER.8 relate the domain of a function to its graph and where applicable, to the quantitative relationship it describes. M.1HS.LER.9 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	I can describe how the domain of a function is conveyed in graph form. I can relate the domain of a function to its graph in a real-world scenario. I can calculate and interpret the average rate of change of a function presented symbolically over a specified interval. I can calculate and interpret the average rate of change of a function presented in a table over a specified interval. I can calculate and interpret the	What are various representations of a function and how can they be interpreted? How do you identify and explain the key features of a function in relation to the context? How do you compare functions and their properties including maxima, minima, domain, range, intercepts, symmetry, end behavior and average rate of change?	Equation Variable Function F(x) Graph Domain Range Y=f(x) Rate Change Slope Interval	Project presentation Journals WACs Peer work/Gallery Walk Dyads	Math 1 Units Cell phone project		

		average rate of change of a function presented in function notation over a specified interval. I can estimate the rate of change from a graph.						
	M.1HS.LER.10 graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	I can decide how best to display a function graphically, either by hand or by technology. I can graph linear functions f(x)=x and understand point-slope form, slope-intercept form, and standard form, and can determine the x and y intercepts for each graph. I can graph	What real world situations can be modeled by a linear relationship? How can technology help to determine whether a linear model is appropriate in a given situation?	Graph Graphing Function Linear Quadratic Exponential Square Zeros Factoring End Behavior X intercept Y intercept Slope	Graphing lab	Linear Equations Cut and Paste Math 1 Units		

		quadratic functions f(x)=x^2, can understand that the vertex of a quadratic function is either the maximum or the minimum, and can identify which it will be by analyzing the equation. I can determine the x and y intercepts for a quadratic graph. I can graph exponential functions and show intercepts and end behavior.						

	M.1HS.LER.11 compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	I can compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	How can a function be represented?	Functions Properties Algebraic representation Graph Numeric representation Table X intercept Y intercept Slope Linear Exponential Quadratic	Gallery walk Matching activities Group work Venn Diagram/graphic organizer	Math 1 Units Exponential Functions Activity		
	M.1HS.LER.12 write a function that describes a relationship between two quantities. M.1HS.LER.13 write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	I can distinguish between an explicit and recursive expression of a function. I can write an explicit expression of a function to describe a real-world scenario. I can write a recursive expression of a function to describe a real-world scenario. I can	How can you decide what type of sequence or function is represented? What are the different ways you can represent an exponential function? How do you create an appropriate function to model data or situations given within context? What new information will be revealed if	Equation Expression Variable Function F(x) Quantity Operations Recursive Explicit Geometric Arithmetic Model Sequence Translate	Student journal Jigsaw activities	MathShell Geometric Sequence Investigation Arithmetic Sequence Investigation Math 1 Units		

		determine steps for calculation for a real-world scenario. I can combine standard function types using arithmetic operations for real-world scenarios. I can distinguish between a recursive and explicit formula and know what each will reveal about a given sequence. I can distinguish between arithmetic and geometric sequences. I can write explicit formulas for arithmetic	this equation is written in a different but equivalent form? How can you decide what type of sequence or function is represented? What are the different ways you can represent an exponential function? How do you create an appropriate function to model data or situations given within context? What new information will be revealed if this equation is written in a different but equivalent form?					

		and geometric sequences. I can identify when a real-world scenario models a geometric sequence. I can identify when a real-world scenario models an arithmetic sequence. I can translate between the recursive and explicit forms of both arithmetic and geometric sequences.						
	M.1HS.LER.14 identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both	I can explain the effect of f(x) + k on the original graph f(x) for both positive and negative values of k, and can find the value of k	What do the key features of an exponential or linear function represent in a modeling situation? How do you	Equation Variable Function F(x) Quantity Compose Composition Build Operations Transform	Calculator Lab Journals/Written responses Jigsaw activity	Math 1 Units Translations activity		

	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.	given the graphs. I can explain the effect of kf(x) on the original graph f(x) for both positive and negative values for k, and can find the value of k given the graphs. I can explain the effect of f(kx) on the original graph f(x) for both positive and negative values for k, and can find the value of k given the graphs. I can explain the effect of f(x+k) on the original graph f(x) for both positive and negative values for k, and can find the value of k given the graphs.	determine if a situation is best modeled by an exponential or linear function? How do you choose units, scale, data displays and levels of accuracy to appropriately represent a situation?	Transformation Graph Technology Calculator Even Odd				

		I can use technology to illustrate the effects of transforming a function. I can recognize an even function from both its graph as well as its algebraic expression. I can recognize an odd function from both its graph as well as its algebraic expression.						
	M.1HS.LER.15 distinguish between situations that can be modeled with linear functions and with exponential functions. M.1HS.LER.16 construct	I can distinguish between linear functions and exponential functions. I can prove that a linear function has a constant slope over equal	What do the key features of an exponential or linear function represent in a modeling situation? How do you determine if a situation is best modeled by an exponential or	Equation Variable Function F(x) Quantity Compose Composition Build Operations Linear Exponential Slope Intervals Decay	Venn diagram/graphic organizer Journals Graphing lab Project presentations	Mathematics Vision Project Texas Instruments Activity Math 1 Unit		

	linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship or two input-output pairs	intervals. I can prove that an exponential function grows by a constant multiplier over equal intervals. I can recognize situations in which one quantity changes at a constant rate per unit interval relative to another. I can recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. I can explain why a	linear function? How do you choose units, scale, data displays and levels of accuracy to appropriately represent a situation?	Percent Arithmetic Geometric Sequence Input-Output pairs				

		function is linear or exponential from data presented in a graph, a table, or a written description. I can construct linear and exponential functions including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs.						
	M.1HS.LER.17 observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically,	I can use graphs and tables to show and compare the different output values and rates of change for linear, quadratic, exponential, and	What do the key features of an exponential or linear function represent in a modeling situation? How do you determine if a situation is best modeled by an	Graph Table Quantity Exponentially Linearly Quadratically Polynomial Function Rate of change Output value	Simulations Modeling Journaling Student debates/conversations	Math 1 Unit Jobs and Money activity		

	or (more generally) as a polynomial function. M.1HS.LER.18 interpret the parameters in a linear or exponential function in terms of a context.	polynomial functions. I can understand that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or as a polynomial function. I can interpret and understand the quantities, rates of change, and other values of an exponential function f(x)=a*b^x + c in the context of a real-world scenario. I can interpret and understand the	exponential or linear function? How do you choose units, scale, data displays and levels of accuracy to appropriately represent a situation?					

		quantities, rates of change, and other values of a linear function f(x)=mx + b in the context of a real-world scenario.						
	M.1HS.CAG.1 use coordinates to prove simple geometric theorems algebraically. M.1HS.CAG.2 prove the slope criteria for parallel and perpendicular lines; use them to solve geometric problems	I can identify the appropriate algebraic method to prove or disprove simple geometric theorems given a set of coordinates. I can use slope to determine if lines in a polygon are parallel. I can use the Pythagorean Theorem to determine if the point (a,b) lies on a circle centered at the origin and containing	How can you use coordinates and algebraic techniques to represent, interpret and verify geometric relationships?	Circle Arc Chord Tangent Angle Central Point Radius Inscribed Pythagorean Theorem Proof Prove Square Parabola Focus Coordinate Cartsian	Journals Student conversation	MathShell Math 1 Unit		

		the point (x,y). I can graph a line on the coordinate plane. I can translate a line parallel to another line on the coordinate plane by preserving its angle. I can determine if two lines are parallel by examining their slopes. I can find the equation of a line parallel or perpendicular to a given line that passes through a given point. I can rotate a line perpendicular to another line on the						

		coordinate plane. I can determine if two lines are perpendicular by examining their slopes. Prove the slope criteria for parallel and perpendicular lines use them to solve geometric problems.						

	M.1HS.CAG.3 use coordinates to compute perimeters of polygons and areas of triangles and rectangles	I can use coordinates to compute perimeters of polygons and areas of triangles and rectangles.	How can you use coordinates and algebraic techniques to represent, interpret and verify geometric relationships?	Circle Arc Chord Tangent Angle Central Point Radius Inscribed Pythagorean Theorem Proof Prove Square Parabola Focus Coordinate Cartsian Perimeter Polygons Area	TechSteps	Math 1 Unit Tech Steps		
	Equations and Inequalities M.1HS.RBQ.1 use units as a way to understand problems and to guide the solution of multi-step problems; choose and	**Equations and Inequalities** I can apply appropriate units when solving multi-step problems I can label each unit to maintain accuracy	**Equations and Inequalities** What is a variable? How do we use them? What are some key words used to signal the four mathematical	**Equations and Inequalities** Quantity Quantities Measure Measurement Unit Units Convert Conversion Graph Graphs	**Equations and Inequalites** Peer work Walk abouts Foldables Video tutorial creation Journals	**Equations and Inequalities** Math 1 Unit Translation Walk Around Writing Equations and Inequalities Help Words		

	interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. M.1HS.RBQ.2 define appropriate quantities for the purpose of descriptive modeling M.1HS.RBQ.3 choose a level of accuracy appropriate to limitations on measurement when reporting quantities M.1HS.RBQ.4 interpret expressions that represent a quantity in terms of its context.	I can scale graphs and displays I can define relevant quantities I can decide on the level of accuracy appropriate for the data I can interpret parts of an expression I can interpret a complicated expression by examining the parts I can create	operations? Explain the difference between a numerical and an algebraic expression.	Data Scale Model Modeling Accuracy Expression Terms Coefficient Equation Inequality Variable Linear Formula Function Solution Method Solve		Literal Equations Scavenger Hunt		

	M.1HS.RBQ.5 create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. M.1HS.RBQ.6 create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales M.1HS.RBQ.7 represent constraints by equations or inequalities,	equations and inequalities and use them to solve problems I can create multi variable equations to represent relationships I can graph multi variable equations I can represent constraints by equations or inequalities I can constraints of systems of equations or inequalities I can determine appropriate solutions in context I can rearrange formulas to solve for what I want	What are the properties for solving an equation/inequality? Why is it important to follow them? How is the process of solving an equation similar and different from the process of solving an inequality?					

	and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. M.1HS.RBQ.8 rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations							
	M.1HS.RWE.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	I can understand solving equations as a process of reasoning and explaining each step I can construct a viable justification for my method chosen	What are the properties for solving an equation/inequality? Why is it important to follow them? How is the process of solving an equation similar and different from the	Equation Equality Solution Argument Systems Linear Inequalities Variable Coefficients Prove Sum				

	equation has a solution. Construct a viable argument to justify a solution method. M.1HS.RWE.2 solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. M.1HS.RWE.3 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.	I can demonstrate 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 I can solve systems of linear equations exactly and approximately	process of solving an inequality? How do you determine if an equation has one solution, many solutions, or no solution?					

	M.1HS.RWE.4 solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables							
	Descriptive Statistics M.1HS.DST.1 represent data with plots on the real number line (dot plots, histograms, and box plots). M.1HS.DST.2 use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range,	**Descriptive Statistics** I can represent data on the real number line I can understand which approach best represents the data set I can determine the five number summary of a box and whisker plot I can define median, mean, interquartile	**Descriptive Statistics** How does representing quantities in different ways reveal different information about the quantities? What types of graphs are used to present data? How can one analyze and critique information presented in graphical form?	**Descriptive Statistics** Data Set Sets Statistics Stats Distribution Spread Deviation Real Number Box Plot Histogram Dot Standard Interquartile Range Scale Mean Median Outlier Compare				

	standard deviation) of two or more different data sets. M.1HS.DST.3 interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	range, and standard deviation I can compare the center of the data distribution I can compare the spread of multiple data sets I can identify extreme data points I can account for possible effects of extreme data points I can decide to omit extreme data points if necessary I can use the mean and standard deviation of a data set to fit to a normal distribution curve I can	How does the normal distribution apply to the real world? How can statistical measures be used to summarize data? How can one determine the extent to which a single observation differs from what is typical?	Normal Technology Population Correlation Coefficient Causation Residual Intercept Slope Point Line Distance Segment Perpendicular Parallel Circle Angle Definition Transformation Plane Function Input Output Draw Graph Rectangle Parallelogram Trapezoid Polygon Congruent Congruence ASA SAS SSS Triangle Rigid Motion Inscribed Hexagon				

		recognize that there are data sets for which a procedure is not accurate						
	M.1HS.DST.4 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. M.1HS.DST.5 represent data on two quantitative variables on a scatter plot and describe how the	I can represent data on a scatter plot given the data I can describe how variables are related on a scatter plot I can decide which type of functions is appropriate to represent the data set I can solve problems by using a function fitted to the data set	Which statistical graph is the best representation for a particular situation?					

	variables are related. M.1HS.DST.6 interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. M.1HS.DST.7 compute (using technology) and interpret the correlation coefficient of a linear fit. M.1HS.DST.8 distinguish between correlation and causation.	I can analyze and interpret the meaning of slope in context of the data I can analyze and interpret the meaning of the intercept in context of the data I can calculate and plot residuals for the data set and functions with a possible fit I can informally assess the fit of a function by analyzing residuals I can fit a linear function for a scatter plot that suggests a linear	How can one determine whether there is a relationship between two issues? How can one use a relationship between past occurrences to make predictions of future events?					

		association I can define correlation coefficient and understand it can only apply to a linear fit I can use technology to compute and interpret the correlation coefficient I can understand that correlation does not imply causation I can determine if two variables seem linked through correlation or causation						
	Proofs and Constructions M.1HS.CPC.1 know precise definitions of angle, circle, perpendicular line, parallel	**Proofs and Constructions** I can explain the characteristics of the undefined	**Proofs and Constructions** What are the basic tools for a geometric construction and how does	**Proofs and Constructions** Angle Circle Perpendicular Line Parallel Segment				

	line and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. M.1HS.CPC.2 represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not	basics in geometry I can use these basics for defining other geometric elements I can precisely define angle, circle, perpendicular line, and line segments I can draw transformations in the plane using transparencies, graph paper, computers, calculators, and whiteboards I can describe transformations as functions that have inputs and outputs I can distinguish between transformation	a construction differ from a measurement? How do you determine the vector associated with a translation, given the pre-image and image?	Point Line Distance Circular Arc Tranformations Plane Transparencies Functions Inputs Outputs Vector Construction Correlation Corresponding Rigid Motion Congruence Reflection Translation Scale Factor Rectangle Parallelogram Trapezoid Polygon Regular Rotation Dilation Center ASA SAS SSS Construction Equilateral Square Hexagon Inscribed				

	M.1HS.CPC.3 given a rectangle, parallelogram, trapezoid or regular polygon, describe the rotations and reflections that carry it onto itself. M.1HS.CPC.4 develop definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments. M.1HS.CPC.5 given a geometric figure and a rotation, reflection or translation, draw the transformed figure using, e.g., graph paper, tracing	s that preserve distance and angles to those that don't I can describe the rotations and reflections that carry polygons onto themselves I can specify a sequence of transformations that will carry a given figure onto another I can draw the transformed figure using graph paper or technology I can explain the properties of dilations given by a center and a scale factor						

	paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. M.1HS.CPC.6 use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. M.1HS.CPC.7 use the definition of congruence in terms of rigid motions to	I can provide descriptions of rigid motions I can explain how each motion preserves distance and angles I can define congruence as equality in shape and size I can use congruence in terms of rigid motions to decide if two figures are congruent I can recognize triangle	What does it mean for two figures to be congruent? How is rigid motion used to prove congruence? How is coordinate geometry used to prove congruence? What are the triangle congruence postulates/theorems? How do you use them to solve problems? How are					

	show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. M.1HS.CPC.8 explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. M.1HS.CPC.9 make formal geometric constructions with a variety of tools and methods M.1HS.CPC.10 construct an equilateral triangle, a square and a regular	congruence in terms of rigid motions I can show how preserving correlating distances and angles between two triangles results in congruence I can identify and correctly use tools to create formal geometric constructions I can accurately create geometric constructions I can define polygons	congruent triangles similar triangles similar and different? How are side lengths or angle measures found in right triangles? How do you use the basic constructions to perform more elaborate constructions?					

	hexagon inscribed in a circle.	inscribed in a circle I can construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle						