ALGEBRA 1 Mathematics Map/Pacing Guide
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Topics & Standards	
Quarter 1 ***Time Frame Weeks 1-8***	**ALGEBRA - SEEING STRUCTURE IN EXPRESSIONS** **Interpret the structure of expressions** • **A.SSE.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. • **A.SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example, to factor 3x(x – 5) + 2(x – 5), students should recognize that the "x – 5" is common to both expressions being added, so it simplifies to (3x+2)(x – 5); or For example, see $x^4 – y^4$ as $(x^2)^2 – (y2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.* **CREATING EQUATIONS** **Create equations that describe numbers or relationships** • **A.CED.1** 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. *a. Focus on applying linear and simple exponential expressions. (A1, M1)* *b. Focus on applying simple quadratic expressions. (A1, M2)* • **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. Focus on applying linear and simple exponential expressions. (A1, M1)* *b. Focus on applying simple quadratic expressions. (A1, M2)* • **A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *a. Focus on formulas in which the variable of interest is linear or square. For example, rearrange Ohm's law V = IR to highlight resistance R, or rearrange the formula for the area of a circle A=(π)r 2 to highlight radius r. (A1)* **REASONING WITH EQUATIONS AND INEQUALITIES** **Understand solving equations as a process of reasoning and explain the reasoning** • **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. **Solve equations and inequalities in one variable** • **A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **Represent and solve equations and inequalities graphically** • **A.REI.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). **NUMBER AND QUANTITY - QUANTITIES**

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Reason quantitatively and use units to solve problems.

• **N.Q.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.

• **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.

FUNCTIONS - INTERPRETING FUNCTIONS

Understand the concept of a function and use function notation

• **F.IF.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).*

• **F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Interpret functions that arise in applications in terms of the context

•**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; and end behavior.*

b. Focus on linear, quadratic, and exponential functions. (A1, M2)

Curriculum Units & Assessment (Evidence)	***Opportunities for Integration***	***Resources (Curriculum & Textbook)***	***Key Concept tools & Practices for Differentiation***
Units: Relationships Between Quantities and Linear Relationships **Formative & Summative Assessments** • 4-7 tasks that reach DOK 3-4 • At least (1) GRASPS per quarter & • Illuminate weekly	**Other Resources** • **ODE Math Model Curriculum -** https://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Mathematics/Model-Curricula-in-Mathematics/HS_Course_Alg-1-_Math_Model-	**Glencoe Algebra I** • Chapter 1: Expressions, Equations, and Functions • Chapter 2: Linear Equations • Chapter 3:Linear Functions ***Be sure to incorporate when needed the following instructional resources available for each chapter; found in the "Resources" tab:**	**Available on ConnectED:** • Dinah Zike's Foldables • Virtual Manipulatives • *"abc* Vocab" Activities • TI Easy Files • Multi-lingual Glossary **Other tools and practices:** • Algebra Tiles • Graphing Calculators • Graphing Software (Desmos)

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	MGraw-Hill Glencoe Assessment Resources (Formative, Pre/Post, and Summative): • Chapter Readiness Checks, Chapter Tests, Quizzes, & Mid-chapter tests • Aleks Software	Curriculum.pdf.aspx?lang=en-US • **Critical Areas of Focus** https://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Mathematics/Ohios-Learning-Standards-in-Mathematics/Transitioning-to-the-2017-Learning-Standards-in-Ma/ALGEBRA-1-CAF.pdf.aspx	• Intro. Video & Animations • Interactive Student Guide • Anticipation Guides & Student Built Vocabulary • eSolutions • "Before you Read" & "Key Points" notes guide • Chapter Projects • Interactive Whiteboard Presentations • H.O.T. Questions	• Aleks Software • Gizmo • Examples of real-world situations that lend themselves to writing equations that model the contexts • Computer Algebra Systems • Area models • Journals • Concept/Anchor Charts • Non-linguistic representations • Discourse and questioning
Topics & Standards ***Quarter 2*** ***Time Frame Weeks 1-8***	**ALGEBRA - CREATING EQUATIONS** **Create equations that describe numbers or relationships** •**A.CED.1** 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. *a. Focus on applying linear and simple exponential expressions. (A1, M1)* *b. Focus on applying simple quadratic expressions. (A1, M2)* • **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. Focus on applying linear and simple exponential expressions. (A1, M1)* *b. Focus on applying simple quadratic expressions. (A1, M2)* • **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. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* •**A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *a. Focus on formulas in which the variable of interest is linear or square. For example, rearrange Ohm's law V = IR to highlight resistance R, or rearrange the formula for the area of a circle A=(π)r 2 to highlight radius r. (A1)* **REASONING WITH EQUATIONS AND INEQUALITIES** **Solve equations and inequalities in one variable** • **A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **Solve systems of equations**			

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	•**A.REI.5** *Verify* 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 *algebraically and graphically.* *a. Limit to pairs of linear equations in two variables. (A1, M1)* • ***A.REI.7*** *Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = –3x$ and the circle $x^2 + y^2 = 3$.* **Represent and solve equations and inequalities graphically** • **A.REI.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). • **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 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. • **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 intersection of the corresponding half-planes. **FUNCTIONS - INTERPRETING FUNCTIONS** **Analyze functions using different representations** • **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 cases. *Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.* ★ *a. Graph linear functions and indicate intercepts. (A1, M1)* *b. Graph quadratic functions and indicate intercepts, maxima, and minima. (A1, M2)* *e. Graph simple exponential functions, indicating intercepts and end behavior. (A1, M1)* ***Interpret linear models.*** • ***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.* ★ **LINEAR, QUADRATIC, AND EXPONENTIAL MODELS** **Construct and compare linear, quadratic, and exponential models and solve problems** • **F.LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions. **a**. *Show* 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.

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• **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.3*** *Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically. ★(A1, M2)*

Interpret expressions for functions in terms of the situation they model

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

BUILDING FUNCTIONS

Build a function that models a relationship between two quantities

• **F.BF.1** Write a function that describes a relationship between two quantities.

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

i. Focus on linear and exponential functions. (A1, M1)

ii. Focus on situations that exhibit quadratic or exponential relationships. (A1, M2)

• **F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Build new functions from existing functions

• **F.BF.4** Find inverse functions.

a. Informally determine the input of a function when the output is known. (A1, M1)

Curriculum Unis & Assessment (Evidence)	***Opportunities for Integration***	***Resources (Curriculum & supplemental)***	***Key Concept tools & Practices for Differentiation***
Units: Linear Relationships **Formative & Summative Assessments** • At least (1) GRASPS per quarter & • Illuminate weekly **MGraw-Hill Glencoe Assessment Resources**		**Glencoe Algebra I** • Chapter 4: Equations of Linear Functions • Chapter 5: Linear Inequalities • Chapter 6: Systems of Equations with Linear Inequalities ***Be sure to incorporate when needed the following instructional resources available**	**Available on ConnectED:** • Dinah Zike's Foldables • Virtual Manipulatives • *"abc* Vocab" Activities • TI Easy Files • Multi-lingual Glossary **Other tools and practices:** • Algebra Tiles • Graphing Calculators • Graphing Software (Desmos)

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	(Formative, Pre/Post, and Summative): • Chapter Readiness Checks, Chapter Tests, Quizzes, & Mid-chapter tests • Aleks Software		**for each chapter; found in the "Resources" tab:** • Intro. Video & Animations • Student Interactive Guides • Anticipation Guides & Student Built Vocabulary • eSolutions • "Before you Read" & "Key Points" notes guide • Chapter Projects • Interactive Whiteboard Presentations • H.O.T. Questions	• Aleks Software • Gizmo • Examples of real-world situations that lend themselves to writing equations that model the contexts • Computer Algebra Systems • Area models • Journals • Concept/Anchor Charts • Non-linguistic representations • Discourse and questioning
Topic & Standard ***Quarter 3*** ***Time Frame Weeks 1-8***	**ALGEBRA - SEEING STRUCTURE IN EXPRESSIONS** **Interpret the structure of expressions** • **A.SSE.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. • **A.SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example, to factor 3x(x – 5) + 2(x – 5), students should recognize that the "x – 5" is common to both expressions being added, so it simplifies to (3x+2)(x – 5); or see $x^4 – y^4$ as $(x^2)^2 – (y2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.* **Write expressions in equivalent forms to solve problems** • **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.** 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. **c.** Use the properties of exponents to transform expressions for exponential functions. *For example, 8^t can be written as 2^{3t}.* **REASONING WITH EQUATIONS AND INEQUALITIES** **Understand solving equations as a process of reasoning and explain the reasoning** • **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. **Solve equations and inequalities in one variable** • **A.REI.4** Solve quadratic equations in one variable.			

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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.

b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, *applying the quadratic formula; or utilizing the Zero-Product Property after factoring.*

Represent and solve equations and inequalities graphically

• **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 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.

FUNCTIONS - INTERPRETING FUNCTIONS

Understand the concept of a function and use function notation

• **F.IF.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 ≥ 1.*

Interpret functions that arise in applications in terms of the context

•**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.*

b. Focus on linear, quadratic, and exponential functions. (A1, M2)

• **F.IF.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.*

b. Focus on linear, quadratic, and exponential functions. (A1, M2)

• **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.

Analyze functions using different representations

• **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 cases. *Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.* ★

a. Graph linear functions and indicate intercepts. (A1, M1)

b. Graph quadratic functions and indicate intercepts, maxima, and minima. (A1, M2)

e. Graph simple exponential functions, indicating intercepts and end behavior. (A1, M1)

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

i. Focus on completing the square to quadratic functions with the leading coefficient of 1. (A1)

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b. Use the properties of exponents to interpret expressions for exponential functions.

i. Focus on exponential functions evaluated at integer inputs. (A1, M2)

• ***F.IF.9*** *Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).*

b. Focus on linear, quadratic, and exponential functions. (A1, M2)

LINEAR, QUADRATIC, AND EXPONENTIAL MODELS

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

• **F.LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.

a. *Show* 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.

• **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).

BUILDING FUNCTIONS

Build a function that models 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, and translate between the two forms.*

Build new functions from existing functions

• **F.BF.3** 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 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.

a. Focus on transformations of graphs of quadratic functions, except for f (kx). (A1, M2)

Curriculum Units & Assessment (Evidence)	*Opportunities for Integration*	*Resources (Curriculum /Textbook)*	*Concept Tools & Practices*
Units: Exponential and Quadratic Relationships **Formative & Summative Assessments**		***Be sure to incorporate when needed the following instructional resources available for each chapter; found in the "Resources" tab:** • Intro. Video & Animations • Student Interactive Guides	**Available on ConnectED:** • Dinah Zike's Foldables • Virtual Manipulatives • *"abc* Vocab" Activities • TI Easy Files • Multi-lingual Glossary

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	• At least (1) GRASPS per quarter & • Illuminate weekly **MGraw-Hill Glencoe Assessment Resources (Formative, Pre/Post, and Summative):** • Chapter Readiness Checks, Chapter Tests, Quizzes, & Mid-chapter tests • Aleks Software		• Anticipation Guides & Student Built Vocabulary • eSolutions • "Before you Read" & "Key Points" notes guide • Chapter Projects • Interactive Whiteboard Presentations H.O.T. Questions	**Other tools and practices:** • Algebra Tiles • Graphing Calculators • Graphing Software (Desmos) • Aleks Software • Gizmo • Examples of real-world situations that lend themselves to writing equations that model the contexts • Computer Algebra Systems • Area models • Journals • Concept/Anchor Charts • Non-linguistic representations
Topic & Standards Quarter 4 ***Time Frame Weeks 1-8***	***STATISTICS AND PROBABILITY*** ***Summarize, represent, and interpret data on a single count or measurement variable.*** • ***S.ID.1*** *Represent data with plots on the real number line (dot plots, histograms, and box plots) in the context of real-world applications using the GAISE model.* ★ • ***S.ID.2*** *In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviation, interquartile range, and standard deviation) of two or more different data sets.* ★ • ***S.ID.3*** *In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).* ★ • ***S.ID.4*** *Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.* ★ ***Summarize, represent, and interpret data on two categorical and quantitative variables.*** • ***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.* ★ • ***S.ID.6*** *Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.* ★ *c. Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)*			

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Time Frame	*Curriculum Units & Assessment (Evidence)*	*Opportunities for Integration*	*Resources (Curriculum /Textbook)*	*Concept Tools & Practices for Differentiation*
	Units: Data Analysis, and Advanced Functions and Equations **Formative & Summative Assessments** • At least (1) GRASPS per quarter & • Illuminate weekly **MGraw-Hill Glencoe Assessment Resources (Formative, Pre/Post, and Summative):** • Chapter Readiness Checks, Chapter Tests, Quizzes, & Mid-chapter tests • Aleks Software	**Other Resources** • **ODE Math Model Curriculum -** https://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Mathematics/Model-Curricula-in-Mathematics/HS_Course_Alg-1-_Math_Model-Curriculum.pdf.aspx?lang=en-US **Critical Areas of Focus** https://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Mathematics/Ohio-s-Learning-Standards-in-Mathematics/Transitioning-to-the-2017-Learning-Standards-in-Ma/ALGEBRA-1-CAF.pdf.aspx	**Glencoe Algebra I** • Chapter 12: Statistics and Probability • Chapter 10: Radical Functions and Geometry • Chapter 11: Rational Functions and Equations ***Be sure to incorporate when needed the following instructional resources available for each chapter; found in the "Resources" tab:** • Intro. Video & Animations • Student Interactive Guides • Anticipation Guides & Student Built Vocabulary • eSolutions • "Before you Read" & "Key Points" notes guide • Chapter Projects • Interactive Whiteboard Presentations • H.O.T. Questions •	**Available on ConnectED:** • Dinah Zike's Foldables • Virtual Manipulatives • *"abc* Vocab" Activities • TI Easy Files • Multi-lingual Glossary **Other tools and practices:** • Algebra Tiles • Graphing Calculators • Graphing Software (Desmos) • Aleks Software • Gizmo • Examples of real-world situations that lend themselves to writing equations that model the contexts • Computer Algebra Systems • Area models • Journals • Concept/Anchor Charts • Non-linguistic representations • Discourse and questioning