

Algebra 1

1st Trimester Expectations

Chapter (McGraw-Hill Algebra 1)	CCSS covered	Key Vocabulary	Suggested Pacing (# of days)
Chapter 0: Preparing for Algebra	8th Grade Content (Prerequisites Review) Utilize as needed throughout Trimester at own pace. This content will not be directly assessed on district exams.		
Chapter 1: Expressions, Equations, and Functions		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. algebraic expression coefficient continuous function coordinate system dependent variable discrete function domain end behavior	14 Days
Lesson 1-1: Variables and Expressions	A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients. A.SSE.2 Use the structure of an expression to identify ways to rewrite it.		
Lesson 1-2: Order of Operations	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.		
Lesson 1-3: Properties of Numbers	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.		
Lesson 1-4: The Distributive Property	A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients. A.SSE.2 Use the structure of an expression to identify ways to rewrite it.		
Lesson 1-5: Equations	A.CED.1 Create equations and inequalities in one variable and use them to solve problems. A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.		
Lesson 1-6: Relations	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). 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 $y = f(x)$.		

Lesson 1-7: Functions	<p>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 $y = f(x)$.</p> <p>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.</p>	<p>exponent factors function identity independent variable intercept like terms multiplicative inverses open sentences order of operations power range replacement set reciprocal solution set symmetry variable</p>	
Lesson 1-8: Interpreting Graphs of Functions	<p>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.</p>		
Chapter 2: Linear Equations		<p>Mathematical Practices:</p> <ol style="list-style-type: none"> 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. 	13 Days
Lesson 2-1: Writing Equations	<p>A.CED.1 Create equations and inequalities in one variable and use them to solve problems.</p>		
Lesson 2-2: Solving One-Step Equations	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		
Lesson 2-3: Solving Multi-Step Equations	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		

Lesson 2-4: Solving Equations with the Variable on Each Side	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>	<p>dimensional analysis equivalent equation formula identity multi-step equation percent of change proportion rate ratio scale model solve an equation unit rate weighted average</p>	
Lesson 2-5: Solving Equations Involving Absolute Value	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		
Lesson 2-6: Ratios and Proportions	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		
Lesson 2-7: Percent of Change	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		
Lesson 2-8: Literal Equations and Dimensional Analysis	<p>A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		
Lesson 2-9: Weighted Averages	<p>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.</p> <p>A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>		

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Chapter 3: Linear Functions		<p>Mathematical Practices:</p> <ol style="list-style-type: none"> 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. <p>arithmetic sequence constant constant of variation direct variation family of functions inductive reasoning linear equation parent function rate of change root slope standard form term x-intercept y-intercept</p>	11 Days
Lesson 3-1: Graphing Linear Equations	<p>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.</p> <p>F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.</p>		
Lesson 3-2: Solving Linear Equations by Graphing	<p>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).</p> <p>F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.</p>		
Lesson 3-3: Rate of Change and Slope	<p>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.</p> <p>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.</p>		
Lesson 3-4: Direct Variation	<p>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).</p> <p>F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.</p>		
Lesson 3-5: Arithmetic Sequences as Linear Functions	<p>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.</p> <p>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).</p>		
Lesson 3-6: Proportional and Non-proportional Relationships	<p>F.LE.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.</p> <p>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).</p>		

Chapter (McGraw-Hill Algebra 1)	CCSS covered	Key Vocabulary	Suggested Pacing (# of days)
Chapter 4: Equations of Linear Functions		<p>Mathematical Practices:</p> <ol style="list-style-type: none"> 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. <p>best-fit line bivariate data correlation coefficient inverse function inverse relation linear extrapolation linear interpolation linear regression median-fit line line of fit parallel lines perpendicular lines point-slope form rate of change scatter plot slope-intercept form</p>	12 Days
Lesson 4-1: Graphing Equations in Slope-Intercept Form	<p>F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.</p> <p>S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p>		
Lesson 4-2: Writing Equations in Slope- Intercept Form	<p>F.BF.1 Write a function that describes a relationship between two quantities.</p> <p>a. Determine an explicit expression, a recursive process, or steps for calculation from a context.</p> <p>b. Combine standard function types using arithmetic operations.</p> <p>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).</p>		
Lesson 4-3: Writing Equations in Point- Slope Form	<p>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.</p> <p>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).</p>		
Lesson 4-4: Parallel and Perpendicular Lines	<p>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).</p> <p>S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p>		
Lesson 4-5: Scatter Plots and Lines of Fit	<p>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.</p> <p>S.ID.6c Fit a linear function for a scatter plot that suggests a linear association.</p>		

<p>Lesson 4-6: Regression and Median-Fit Lines</p>	<p>S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</p> <ul style="list-style-type: none"> a. 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. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. <p>S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.</p>		
<p>Lesson 4-7: Inverse Linear Functions</p>	<p>A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</p> <p>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.</p>		

ALGEBRA 1



Contents in Brief and Pacing

▼ Contents in Brief and Pacing

Contents	Pacing (Days)	Block Pacing
Chapter 0 Preparing for Algebra	8	0
Unit 1 Relationships between Quantities		
Chapter 1 Expressions, Equations, and Functions	14	7
Chapter 2 Linear Equations	13	10
Unit 2 Linear Relationships		
Chapter 3 Linear Functions	11	6
Chapter 4 Equations of Linear Functions	12	8
Chapter 5 Linear Inequalities	11	6
Chapter 6 Systems of Linear Equations and Inequalities	12	7
Unit 3 Exponential and Quadratic Relationships		
Chapter 7 Exponents and Exponential Functions	12	7
Chapter 8 Quadratic Expressions and Equations	16	9
Chapter 9 Quadratic Functions and Equations	15	9
Unit 4 Advanced Functions and Equations		
Chapter 10 Radical Functions and Geometry	12	8
Chapter 11 Rational Functions and Equations	13	7
Unit 5 Data Analysis		
Chapter 12 Statistics and Probability	11	7
Total Days	160	90

Number and Quantity

The Real Number System N-RN

Extend the properties of exponents to rational exponents.

1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Use properties of rational and irrational numbers.

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

Quantities ★ N-Q

Reason quantitatively and use units to solve problems.

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Algebra

Seeing Structure in Expressions A-SSE

Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context. ★
 - a. Interpret parts of an expression, such as terms, factors, and coefficients.
 - b. Interpret complicated expressions by viewing one or more of their parts as a single entity.
2. Use the structure of an expression to identify ways to rewrite it.

Write expressions in equivalent forms to solve problems.

3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ★
 - a. Factor a quadratic expression to reveal the zeros of the function it defines.
 - b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

- c. Use the properties of exponents to transform expressions for exponential functions.

Arithmetic with Polynomials and Rational Expressions A-APR

Perform arithmetic operations on polynomials.

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.

Creating Equations ★ A-CED

Create equations that describe numbers or relationships.

1. Create equations and inequalities in one variable and use them to solve problems.
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Reasoning with Equations and Inequalities A-REI

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

1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Solve equations and inequalities in one variable.

3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
4. Solve quadratic equations in one variable.
 - a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
 - b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic

formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Solve systems of equations.

5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Represent and solve equations and inequalities graphically.

10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
11. Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
12. Graph the solutions to a linear inequality in two variables as a halfplane (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 F-IF

Understand the concept of a function and use function notation.

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

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

4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. ★
5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
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.

7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★
 - a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
 - b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
 - e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. ★
 - a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
 - b. Use the properties of exponents to interpret expressions for exponential functions.
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Building Functions F-BF

Build a function that models a relationship between two quantities.

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.

- b. Combine standard function types using arithmetic operations.
- 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.
- 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.
- 4. Find inverse functions.
 - a. 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.

Linear, Quadratic, and Exponential Models F-LE

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

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

Interpret expressions for functions in terms of the situation they model.

- 5. Interpret the parameters in a linear or exponential function in terms of a context.

Mathematical Modeling Standards

Mathematical Modeling Standards

Statistics and Probability

Interpreting Categorical and Quantitative Data S-ID

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

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

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

5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
 - a. Fit a function to the data; use 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.
 - b. Informally assess the fit of a function by plotting and analyzing residuals.
 - c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models.

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

★ Mathematical Modeling Standards