Sample Year-Long Schedule for Math Instruction
Agile Mind Intensified Algebra I

Intensified Algebra I is a comprehensive, extended-period course that is designed to help students who are one to three years behind in mathematics re-engage as motivated learners and succeed in Algebra I within a single academic year. The Agile Mind Intensified Algebra I course incorporates review and repair strategies for pre-algebra concepts and skills within the Algebra I curriculum.

Suggested Implementation Calendar[1]

The following sample schedule integrates the Intensified Algebra I curriculum, LEAP 360 Diagnostic and LEAP 360 Interim Assessments to allow teachers to move at a pace that best supports student learning.

- The Agile Mind Intensive Algebra I course requires at least 80 minutes of math instruction each day.

Algebra I	Topic	Number of Lessons	Additional Notes
Administer Algebra I LEAP 360 Diagnostic The Agile Mind LEAP 360 Diagnostic Mapping can also be used to support teachers in identifying where students may have unfinished learning and need additional supports.			
Unit 1: Getting started with Algebra			
Week 2	1: Exploring problem-solving strategies	5 lessons	This topic contains an optional reinforce lesson on addition and subtraction of signed numbers.
Week 3	2: Getting smarter through algebraic reasoning	5 lessons	Aligned to LSSM
Weeks 4-5	3: Foundations of algebra	10 lessons	Aligned to LSSM
Unit 2: Introduction to functions and equations			
Week 6	4: Representing mathematical relationships in multiple ways	6 lessons	This topic includes an optional extension lesson that builds upon students' work with the Banquet Table Problem in Lesson 2, extending the problem to tables of other shapes. Lesson activities on writing arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms go beyond the LSSM of Algebra I and can be reserved for after statewide testing.
Week 7	5: Problem solving and metacognition	5 lessons	Aligned to LSSM

[1] *Adapted from guidance developed by Agile Mind*

Algebra I	Topic	Number of Lessons	Additional Notes
Week 8-9	6: Working with functions and equations	7 lessons	This topic includes an optional reinforce lesson that provides students with additional practice around the concepts covered in this topic.
Unit 3: Rate of change			
Week 10-11	7: Exploring rate of change in motion problems	8 lessons	Aligned to LSSM
Week 12	8: Mindset, motivation, and algebraic thinking	5 lessons	Aligned to LSSM
Week 12	9: Exploring rate of change in other situations	7 lessons	Aligned to LSSM
Unit 4: Linear functions			
Week 14	10: Understanding slope and intercepts	6 lessons	Aligned to LSSM
Week 15	11: Parallel and perpendicular lines	3 lessons	Aligned to LSSM
Week 16	12: Creating linear models for data	7 lessons	Aligned to LSSM
Week 17	13: Analyzing univariate data	4 lessons	Aligned to LSSM
Week 18	14: Comparing distributions	3 lessons	Aligned to LSSM
Week 19	15: Analyzing bivariate data	5 lessons	Aligned to LSSM
Unit 6: Linear equations and inequalities			
Week 20	16: Solving linear equations	8 lessons	Optional Lesson(s): 7
Week 21	17: Problem solving with slope triangles	3 lessons	Aligned to LSSM
Week 22	18: Solving linear inequalities	6 lessons	Optional Lesson(s): 4
Unit 7: Systems of linear equations and inequalities			

Algebra I	Topic	Number of Lessons	Additional Notes
Week 23-24	19: Formulating and solving systems	9 lessons	Aligned to LSSM
Week 25	20: Building fluency with equation solving	3 lessons	Aligned to LSSM
Weeks 25-26	21: Other methods for solving systems	8 lessons	Aligned to LSSM
Administer Algebra I LEAP 360 Interim Form 1			
Unit 8: Quadratic functions and equations			
Week 27-28	22: Quadratic models and equations	11 lessons	Aligned to LSSM
Week 29	23: Operations on polynomials	6 lessons	Aligned to LSSM
Week 30-31	24: Factoring and quadratic equations	9 lessons	Aligned to LSSM
Unit 9: Other nonlinear relationships			
Week 32	25: Exponents and exponential models	5 lessons	Optional Lesson(s): 4
Week 33	26: Problem solving with exponential functions	4 lessons	Lesson activities on graphing logarithmic and trigonometric functions go beyond the LSSM of Algebra I and can be reserved for after statewide testing.
Administer Algebra I LEAP 360 Interim Form 2			
Week 34	**Reserved for state testing (dates will vary)**		
Weeks 35-36	27: Cubic, square root, cube root, and step functions	6 lessons	Optional Lesson(s): All
	To best prepare your students for success in future math courses, use this time to continue pursuing mastery of A1: A-REI.B.4a. If students have mastered completing the square, a review of Grade 8 Geometry standards may prove advantageous for preparing students for future success.		

Agile Mind Intensified Algebra I Scope and Sequence, 2019-2020
Louisiana Student Standards for Mathematics

These course materials are designed to support 164-170 lessons (1 lesson equals 80 minutes).

Agile Mind Topics	Time allotment	Topic Descriptions	Louisiana Student Standards for Mathematics • Standards in black are the primary instructional focus of the topic. • Standards in grey support topic content or indicate foundations for future work.
Opportunities for students to apply the practices of making sense of problems and persevere in solving them, reasoning abstractly and quantitatively, constructing viable arguments, modeling with mathematics, using appropriate tools strategically, attending to precision, looking for and making use of structure, and looking for and expressing regularity in repeated reasoning are evident throughout this course. (Standards for Mathematical Practice) **Because Intensified Algebra I incorporates review and repair strategies for pre-algebra concepts and skills, standards prior to Algebra I have been included.**			
Unit 1: Getting started with Algebra			
1: Exploring problem-solving strategies	5-6 lessons *This topic contains an optional reinforce lesson on addition and subtraction of signed numbers.*	Students experience collaboration as a strategy to solve problems. They share problem-solving strategies as they explore problems that have one or more solutions. They also begin an exploration of arithmetic and geometric sequences. **Shaping attitudes toward learning:** • Students learn about their teacher, their classmates, and this course; • Students learn strategies for being effective communicators; • Students learn and practice norms and routines to aid collaboration and overall learning. **Focus Skill work:** • Operations with signed numbers • Addition • Subtraction	**The Number System — 6.NS** C. Apply and extend previous understandings of numbers to the system of rational numbers. 6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. 7. Understand ordering and absolute value of rational numbers. c. Understand the absolute value of a rational number as its distance from 0 on the number line; ~~interpret absolute value as magnitude for a positive or negative quantity in a real-world situation~~. **The Number System — 7.NS** A. Apply and extend previous understandings of operations with fractions. 1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. b. ~~Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative.~~ Show that a number and its opposite have a sum of 0 (are additive inverses). ~~Interpret sums of rational numbers by describing real-world contexts.~~ c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference~~, and apply this principle in real-world contexts~~. d. Apply properties of operations as strategies to add and subtract rational numbers. 3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1] **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 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).
2: Getting smarter through algebraic reasoning	5 lessons	This topic introduces students to the ideas of malleable intelligence and brain growth through learning. Students continue to develop problem-solving strategies as they extend their understanding of patterns. **Shaping attitudes toward learning:** • Students examine and reflect on the perceptions of their math ability; • Students learn how intelligence is malleable, not fixed; • Students understand how working on challenging problems affects the brain. **Focus Skill work:** • Operations with signed numbers • Multiplication • Division	**The Number System — 7.NS** A. Apply and extend previous understandings of operations with fractions. 2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. **Quantities★— N-Q** A. Reason quantitatively and use units to solve problems. 2. Define appropriate quantities for the purpose of descriptive modeling.
3: Foundations of algebra	10 lessons	Students investigate the use of variables to represent unknowns and to generalize relationships. They also review important graphing skills.	**Expressions and Equations — 6.EE** A. Apply and extend previous understandings of arithmetic to algebraic expressions. 2. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole- number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). 3. Apply the properties of operations to generate equivalent expressions. 4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). B. Reason about and solve one-variable equations and inequalities. 6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. **Expressions and Equations —7.EE** A. Use properties of operations to generate equivalent expressions. 1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients to include multiple grouping symbols (e.g., parentheses, brackets, and braces). B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 4. Use variables to represent quantities in a real-world or mathematical problem, and construct

			simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form ***px*** + ***q*** = ***r*** and ***p***(***x*** + ***q***) = ***r***, where ***p***, ***q***, and ***r*** are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* **Seeing Structure in Expressions — A-SSE** A. Interpret the structure of expressions 2. Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$, or see $2x^2 + 8x$ as (2x)(x) + 2x(4), thus recognizing it as a polynomial whose terms are products of monomials and the polynomial can be factored as 2x(x + 4).* **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 1. Write a linear, ~~quadratic, or exponential~~ function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. **Interpreting Functions — F-IF** A. 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).~~ **Creating equations★ — A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities~~; graph equations on coordinate axes with labels and scales~~.

Agile Mind Intensified Algebra I Scope and Sequence, 2019-2020
Louisiana Student Standards for Mathematics

Unit 2: Introduction to functions and equations			
4: Representing mathematical relationships in multiple ways	6-7 lessons This topic includes an optional extension lesson that builds upon students' work with the Banquet Table Problem in Lesson 2, extending the problem to tables of other shapes.	This topic begins a key theme of the course: Relationships between variables can be represented using words, tables, graphs, or symbols. Students are formally introduced to different ways to represent patterns and relationships and begin to connect various representations of proportional and non-proportional situations to one another (verbal, numeric, graphical, algebraic). They also extend their understanding of multiple representations in a way that will pay big dividends in Algebra I: They begin to learn to generate other, related representations when given a single representation of a pattern or relationship.	**Expressions and Equations — 6.EE** B. Reason about and solve one-variable equations and inequalities. 6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. C. Represent and analyze quantitative relationships between dependent and independent variables. 9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, though of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **Interpreting Functions — 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.* **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Seeing Structure in Expressions — A-SSE** A. Interpret the structure of expressions 1. Interpret the structure of expressions. 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.
5: Problem solving and metacognition	5 lessons	Students further develop their problem-solving capabilities and their algebraic thinking by working on a non-routine problem. Students also explicitly explore the use of metacognitive strategies to improve their problem solving and learning. **Shaping attitude toward learning:** • Students understand the roles of confusion and metacognition in the learning process. **Focus Skill work:** Scaling graph axes.	**Expressions and Equations — 6.EE** B. Reason about and solve one-variable equations and inequalities. 6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. C. Represent and analyze quantitative relationships between dependent and independent variables. 9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **The Number System — 6.NS** C. Apply and extend previous understandings of numbers to the system of rational numbers. 6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate

			plane. **Quantities★— N-Q** A. 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.
6: Working with functions and equations	7-8 lessons This topic includes an optional reinforce lesson that provides students with additional practice around the concepts covered in this topic.	Students are informally introduced to the concept of function as a dependency relationship between two variables, in which one depends on the other in a systematic way. Students extend their growing understanding of multiple representations and use them to represent functions involving proportional and non-proportional linear relationships algebraically, numerically, graphically and verbally. Students also extend their understanding of functions to include representing sequences as functions.	**Expressions and Equations — 6.EE** C. Represent and analyze quantitative relationships between dependent and independent variables. 9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **Ratios and Proportional Relationships —7.RP** A. Analyze proportional relationships and use them to solve real-world and mathematical problems. 2. Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. **Functions — 8.F** A. Define, evaluate, and compare functions. 1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. **Quantities★— N-Q** A. Reason quantitatively and use units to solve problems. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 1. Create equations ~~and inequalities~~ in one variable and use them to solve problems. Include equations arising from linear ~~quadratic f, and simple exponential~~ functions. 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 non-viable options in a modeling context. **Reasoning with Equations and Inequalities—A-REI** D. Represent and solve equations and inequalities graphically. 10. Understand that the graph of an equation in two variables is the set of all its solution plotted in the coordinate plane, often forming a curve (which could be a line). **Interpreting Functions — F-IF** A. 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 whose domain is a subset of the integers. Relate arithmetic sequences to linear functions and geometric sequences to exponential functions. B. Analyze functions using different representations. 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 1. Write a linear~~, quadratic, or exponential~~ function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 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).
Unit 3: Rate of change			
7: Exploring rate of change in motion problems	8 lessons	Understanding the rate at which one quantity changes with respect to another is key to understanding how the two quantities are related. In this topic, students explore the concept of rate by analyzing motion over time. Students investigate the rate at which distance changes numerically and graphically.	**Functions — 8.F** B. Use functions to model relationships between quantities. 5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. **Quantities★— N-Q** A. Reason quantitatively and use units to solve problems. 3. Choose level of accuracy appropriate to limitations on measurement when reporting quantities. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context. 4. For linear, piecewise linear ~~(to include absolute value), quadratic, and exponential~~ functions that model 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~~.* 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 linear, ~~quadratic,~~ piecewise linear ~~(to include absolute value), and exponential~~ function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 1. Distinguish between situations that can be modeled with linear and exponential functions. b. Recognize situations in which one quantity changes at a constant rate per unit interval

			relative to another.
8: Mindset, motivation, and algebraic thinking	5 lessons	Students further develop their problem-solving capabilities and algebraic thinking by working on a non-routine problem. Students reflect on their mindset as they work on the problem, and learn that mindset can affect success. **Shaping attitudes toward learning:** • Students learn what is meant by the term mindset and how mindsets can affect success; • Students develop strategies to maintain a positive mindset; • Students understand that maintaining motivation while engaged in learning tasks can result in more effective effort; • Students recognize that setting goals can help maintain motivation; • Students set useful goals. **Focus Skill work:** Working with unit rates.	**Ratios and Proportional Relationships — 6.RP** A. Understand ratio concepts and use ratio reasoning to solve problems. 1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 2. Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. **Ratios and Proportional Relationships —7.RP** A. Analyze proportional relationships and use them to solve real-world and mathematical problems. 1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
9: Exploring rate of change in other situations	7 lessons	This topic deepens student understanding of the central ideas of rate of change. Students discover that they can model data sets that have a constant rate of change with a linear function. Students also learn that not all data are linear, and thus require other models.	**Expressions and Equations — 8.EE** B. Understand the connections between proportional relationships, lines, and linear equations. 5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. **Functions — 8.F** A. Define, evaluate, and compare functions. 4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. **Quantities★— N-Q** A. 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. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 4. For linear, ~~piecewise linear (to include absolute value)~~, quadratic, and exponential functions that model 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~~.*★ 6. Calculate and interpret the average rate of change of a linear, quadratic, ~~piecewise linear (to include absolute value)~~, and exponential function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★ **Linear, Quadratic, and Exponential Models★— F-LE** A. 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. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
Unit 4: Linear functions			
10: Understanding slope and intercepts	6 lessons	This topic relates the constant rate of change of a linear function, the slope of the line that is the linear function's graph, and the value of m in the linear function rule y = mx + b. Students explore this connection using tables, graphs, and function rules. It also develops students' understanding of the x- and y-intercepts of the graph of a linear model and the relationship between the intercepts and the situation being modeled. Students learn to find the values of the intercepts directly from linear function rules expressed in slope intercept form (y = mx + b) or standard form (Ax + By = C).	**Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; ~~graph equations on coordinate axes with labels and scales.~~ **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 4. For linear, piecewise linear (to include absolute value), ~~quadratic, and exponential~~ functions that model 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~~ .*★ 6. Calculate and interpret the average rate of change of a linear, ~~quadratic,~~ piecewise linear (to include absolute value), ~~and exponential~~ function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★ C. 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 piecewise linear (to include absolute value) ~~and exponential~~ functions. 9. Compare properties of two functions (linear, ~~quadratic, piecewise linear [to include absolute value] or exponential~~) each represented in a different way. *For example, given a graph of one quadratic function and an algebraic expression for another, determine which has the larger maximum.* **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 1. Write a linear~~, quadratic, or exponential~~ function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

			Linear, Quadratic, and Exponential Models★— F-LE A. 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. 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). B. 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. **Interpreting Categorical and Quantitative Data — S★-ID** C. 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.
11: Parallel and perpendicular lines	3 lessons	Students explore the value of m in the linear function rule y = mx + b and the relationships between slopes of parallel and perpendicular lines and connect the equations of lines to their graphs and descriptions. **Focus Skill work:** Writing and analyzing various forms of equations of lines including standard form, slope-intercept form, and point-slope form while practicing the distributive property and collecting like terms.	**Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Interpreting Functions — F-IF** C. 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~~. **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 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 — F-BF** A. Build a function that models a relationship between two quantities 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). Without technology, find the value of k given the graphs of linear and quadratic functions. With technology, experiment with cases and illustrate an explanation of the effects on the graph that include cases where $f(x)$ is a linear~~, quadratic, piecewise linear (to include absolute value) or exponential~~ function. ~~.~~
12: Creating linear models for data	7 lessons	This topic revisits analyzing rate of change to determine whether using a linear model to represent data is appropriate. It also develops the point-slope form for the equation of a line,	**Quantities★— N-Q** A. 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.

		explicitly connects the point-slope and slope intercept forms, and introduces students to the idea of transformations of functions by transforming the basic function y=x to create linear models for data. Linear regression and correlation is explored when finding the line of best fit for a data set.	2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 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.* **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 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). Without technology, find the value of *k* given the graphs of linear and quadratic functions. With technology, experiment with cases and illustrate an explanation of the effects on the graph that include cases where *f*(*x*) is a linear~~, quadratic, piecewise linear (to include absolute value) or exponential~~ function. **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 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). **Interpreting Categorical and Quantitative Data — S★-ID** B. Summarize, represent, and interpret data on two categorical and quantitative variables. 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.* c. Fit a linear function for a scatter plot that suggests a linear association. C. 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.

Agile Mind Intensified Algebra I Scope and Sequence, 2019-2020
Louisiana Student Standards for Mathematics

Unit 5: Statistical modeling			
13: Analyzing univariate data	4 lessons	In this topic, students explore and analyze univariate numerical data. They will construct different graphical displays to represent data and use these displays to investigate properties of data distributions such as measures of center and spread. Students will also summarize data using different measures of center and spread, including mean, median, IQR, and standard deviation.	**Statistics and Probability — 6.SP** A. Develop understanding of statistical variability. 2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. 5. Summarize numerical data sets in relation to their context, such as by: c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. **Interpreting Categorical and Quantitative Data — S★-ID** A. Summarize, represent, and interpret data on a single count or measurement variable 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).
14: Comparing distributions	3 lessons	In this topic, students will continue to explore and analyze univariate numerical data focusing on comparing two data sets. They will use different graphical displays to represent data to compare data sets and also also compute measures of central tendency and variability and use these measures to compare the data sets.	**Statistics and Probability — 6.SP** A. Develop understanding of statistical variability. 2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. 5. Summarize numerical data sets in relation to their context, such as by: c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. **Interpreting Categorical and Quantitative Data — S★-ID** A. Summarize, represent, and interpret data on a single count or measurement variable 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.
15: Analyzing bivariate data	5 lessons	Students will explore methods for analyzing bivariate categorical data. Students create two-way frequency tables and compute marginal, joint, and conditional relative frequencies and interpret these proportions within the context of the data. They will also continue to investigate bivariate	**Statistics and Probability — 8.SP** A. Investigate patterns of association in bivariate data. 4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. **Interpreting Categorical and Quantitative Data — S★-ID**

		numerical data as they learn about ways to assess the suitability of a linear model.	B. 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. b. Informally assess the fit of a function by plotting and analyzing residuals.

Unit 6: Linear equations and inequalities			
16: Solving linear equations	8-9 lessons *Lesson 7 addresses graphical and analytic solution techniques for absolute value equations. Analytic solution techniques may go beyond your district's expectations for Algebra I students.*	In this topic, students learn how equations are related to functions. The topic explores how different representations of a function lead to techniques to solve linear equations, including tables, graphs, concrete models, algebraic operations, and "undoing" (reasoning backwards).	**Expressions and Equations — 6.EE** B. Reason about and solve one-variable equations and inequalities. 5. Understand solving an equation ~~or inequality~~ as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation ~~or inequality~~ true. 7. Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. **Expressions and Equations —7.EE** B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form ***px*** + ***q*** = ***r*** and ***p***(***x*** + ***q***) = ***r***, where ***p***, ***q***, and ***r*** are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. **Expressions and Equations — 8.EE** C. Analyze and solve linear equations and pairs of simultaneous linear equations. 7. Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form ***x*** = ***a***, ***a*** = ***a***, or ***a*** = ***b*** results (where ***a*** and ***b*** are different numbers) b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 1. Create equations ~~and inequalities~~ in one variable and use them to solve problems. *Include equations arising from linear ~~quadratic, and simple exponential functions~~.* 3. Represent constraints by equations ~~or inequalities~~, ~~and by systems of equations and/or inequalities,~~ and interpret solutions as viable or non- viable 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** A. 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. B. Solve equations and inequalities in one variable 3. Solve linear equations ~~and inequalities~~ in one variable, including equations with coefficients represented by letters. D. Represent and solve equations ~~and inequalities~~ graphically 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,~~ piecewise linear (to include absolute value)~~, and exponential~~ functions.★
17: Problem solving with slope triangles	3 lessons	Students apply what they know about linear functions and equations in order to solve a challenging problem, while continuing to reinforce effective communication skills **Focus Skill work:** Working with slope, with an emphasis on slope triangles and the geometric connection to slope.	**Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 4. For linear~~, piecewise linear (to include absolute value), quadratic, and exponential~~ functions that model 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.~~★*
18: Solving linear inequalities	6-7 lessons *Lesson 4 addresses analytic solution techniques for absolute value inequalities, which may go beyond your district's expectations for Algebra I students.*	This topic introduces students to solution techniques for linear inequalities. Students learn to solve with graphs, tables, and algebraic operations.	**Expressions and Equations — 6.EE** B. Reason about and solve one-variable equations and inequalities. 5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the ~~equation or~~ inequality true? Use substitution to determine whether a given number in a specified set makes an ~~equation or~~ inequality true. 8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. **Expressions and Equations —7.EE** B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it

			in the context of the problem. **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 1. Create ~~equations and~~ inequalities in one variable and use them to solve problems. ~~Include equations arising from linear, quadratic functions, and simple exponential functions.~~ 3. Represent constraints by ~~equations or~~ inequalities, ~~and by systems of equations and/or inequalities,~~ and interpret solutions as viable or non-viable options in a modeling context. **Reasoning with Equations and Inequalities—A-REI** B. Solve equations and inequalities in one variable 3. Solve linear ~~equations and~~ inequalities in one variable~~, including equations with coefficients represented by letters~~. D. Represent and solve equations ~~and inequalities~~ graphically 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~~.
Unit 7: Systems of linear equations and inequalities			
19: Formulating and solving systems	9 lessons	This topic builds on students' understanding of solving linear equations and inequalities while introducing the concept of a system of equations and inequalities as connected to finding the values of two different variables in a situation. Students further develop their skill at representing situations, now using two variables and systems of equations and inequalities, engage in activities that help them understand the meaning of a solution to a system across multiple representations, and learn to solve systems using logical thinking, tables, and graphs. These activities help surface underlying mathematical ideas, introduce vocabulary, and develop a conceptual foundation to prepare students for success with the more general symbolic methods introduced in Topic 21.	**Creating equations★— A-CED** A. Create equations that describe numbers or relationships 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 non-viable options in a modeling context. **Reasoning with Equations and Inequalities—A-REI** C. Solve systems of equations. 6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. D. Represent and solve equations and inequalities graphically. 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.
20: Building fluency with equation solving	3 lessons	Students continue to develop their problem solving and algebraic thinking capabilities by working on a non-routine problem, The Speeding Car Problem. **Focus Skill Work:** Solving multi-step equations.	**Reasoning with Equations and Inequalities—A-REI** B. Solve equations and inequalities in one variable 3. Solve linear equations ~~and inequalities~~ in one variable, including equations with coefficients represented by letters.

21: Other methods for solving systems	8 lessons	Continuing with the exploration of systems of two linear equations, this topic introduces two additional algebraic methods for solving systems: the substitution method and the linear combination method. Students begin to see when to use each method, and how to interpret the results each method yields.	**Creating equations★— A-CED** A. Create equations that describe numbers or relationships 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 non-viable options in a modeling context. **Reasoning with Equations and Inequalities—A-REI** C. 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.
Unit 8: Quadratic functions and equations			
22: Quadratic models and equations	11 lessons	This topic introduces students to quadratic equations that arise from quadratic functions. Students learn how to use functions of the form $y = ax^2 + c$ to model quadratic relationships. They also explore the effects of parameter changes, including vertical and horizontal shifts and dilations. Students make connections among the x-intercepts of a graph, the zeros of a function, and the solutions of an equation as they learn to solve quadratic equations by graphing. Students are also introduced to the quadratic formula as a second method for solving quadratic equations. Since using this formula sometimes requires students to simplify expressions containing square roots, the connection between the algebra and the geometry of square roots is explored. Students also learn how the value of the discriminant indicates the nature of the solutions.	**The Real Number System — N-RN** B. 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. **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Reasoning with Equations and Inequalities—A-REI** B. Solve equations and inequalities in one variable 4. Solve quadratic equations in one variable. 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 "no real solution." 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, piecewise linear (to include absolute value), and exponential~~ functions. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 4. For ~~linear, piecewise linear (to include absolute value),~~ quadratic~~, and exponential~~ functions that model 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.*★ 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.* C. 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. **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 1. Write a ~~linear,~~ quadratic~~, or exponential~~ function that describes a relationship between two quantities.★ a. Determine an explicit expression, ~~a recursive process, or steps for calculation~~ from a context. 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). Without technology, find the value of k given the graphs of ~~linear and~~ quadratic functions. With technology, experiment with cases and illustrate an explanation of the effects on the graph that include cases where $f(x)$ is a ~~linear,~~ quadratic, ~~piecewise linear (to include absolute value) or exponential~~ function. **Interpreting Categorical and Quantitative Data — S-ID** B. Summarize, represent, and interpret data on two categorical and quantitative variables. 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 and~~ quadratic models.*
23: Operations on polynomials	6 lessons	In this topic students explore polynomial operations in a situation involving the floor plan of a house. They learn how to multiply, add, and subtract polynomials using concrete models and analytic techniques.	**Seeing Structure in Expressions — A-SSE** A. 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. **Arithmetic with Polynomial and Rational Expressions—A-APR** A. 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.
24: Factoring and quadratic equations	9 lessons	This topic builds on the work of the previous topic by introducing students to the concept of factoring a polynomial expression. Students develop an understanding of the factoring process by making connections between concrete models and analytic techniques. Students also use concrete models to solve an equation by completing the square and connect the concrete model to the algebraic technique. Students then	**Seeing Structure in Expressions — A-SSE** A. Interpret the structure of expressions 2. Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$, or see $2x^2 + 8x$ as $(2x)(x) + 2x(4)$, thus recognizing it as a polynomial whose terms are products of monomials and the polynomial can be factored as $2x(x + 4)$.* B. 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.

		apply the methods of factoring and completing the square to solve quadratic equations and further solidify their understanding of the connections among the solutions of an equation, the x-intercepts of a graph, and the zeros of a function. Completing the square is also used to reveal certain characteristics about quadratic functions.	b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **Arithmetic with Polynomials and Rational Expressions —A-APR** B. Understand the relationship between zeros and factors of polynomials 3. Identify zeros of quadratic functions, and use the zeros to sketch a graph of the function defined by the polynomial. **Reasoning with Equations and Inequalities—A-REI** B. Solve equations and inequalities in one variable 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 "no real solution."~~ **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context 4. For ~~linear, piecewise linear (to include absolute value),~~ quadratic~~, and exponential~~ functions that model 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 function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; ~~and end behavior.~~*★ C. 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. 8. Write a ~~linear,~~ quadratic~~, or exponential~~ 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.
Unit 9: Other nonlinear relationships			
25: Exponents and exponential models	5-6 lessons *Lesson 4 addresses fractional exponents, which may go beyond your district's expectations for Algebra I students.*	Students review the meaning of exponents and use patterns to build their understanding of zero, negative, and rational exponents with a numerator of 1. They use their prior understanding of multiplication to work from examples to develop the laws of exponents, then apply these laws to solve problems and to simplify numerical and variable expressions. Students also apply their	**Expressions and Equations — 6.EE** A. Apply and extend previous understandings of arithmetic to algebraic expressions. 1. Write and evaluate numerical expressions involving whole-number exponents. **Expressions and Equations — 8.EE** A. Work with radicals and integer exponents. 1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 1. Distinguish between situations that can be modeled with linear functions and exponential

		understanding of functions and exponents to understand the connection with repeated multiplication and growth and decay.	functions. a. Prove that ~~linear functions grow by equal differences over equal intervals, and that~~ exponential functions grow by equal factors over equal intervals. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. 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~~.
26: Problem solving with exponential functions	4 lessons	Students continue investigating exponential functions by writing rules for exponential functions and examining their behavior. Students also explore the effects of changing the a and b parameters in a function of the form $y = ab^x$.	**Seeing Structure in Expressions — A-SSE** B. 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.★ c. Use the properties of exponents to transform expressions for exponential functions emphasizing integer exponents. *For example, the growth of bacteria can be modeled by either $f(t) = 3^{(t+2)}$ or $g(t) = 9^{(3t)}$ because the expression $3^{(t+2)}$ can be rewritten as $(3^t)(3^2) = 9^{(3t)}$.* **Creating equations★— A-CED** A. Create equations that describe numbers or relationships 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Interpreting Functions — F-IF** B. Interpret functions that arise in applications in terms of the context. 4. For ~~linear, piecewise linear (to include absolute value), quadratic, and~~ exponential functions that model 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.* 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. C. 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. ★ b. Graph ~~piecewise linear (to include absolute value) and~~ exponential functions. 9. Compare properties of two functions (~~linear, quadratic, piecewise linear [to include absolute value] or~~ exponential) each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, determine which has the larger maximum.* **Building Functions — F-BF** A. Build a function that models a relationship between two quantities 1. Write a ~~linear, quadratic, or~~ exponential function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. 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). ~~Without technology, find the value of k given the graphs of linear and quadratic functions.~~ With technology, experiment with cases and illustrate

			an explanation of the effects on the graph that include cases where $f(x)$ is a ~~linear, quadratic, piecewise linear (to include absolute value) or~~ exponential function. **Linear, Quadratic, and Exponential Models★— F-LE** A. Construct and compare linear, quadratic, and exponential models and solve problems 1. Distinguish between situations that can be modeled with linear functions and 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. 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. 5. Interpret the parameters in a ~~linear or~~ exponential function in terms of a context.
27: Cubic, square root, cube root, and step functions	6 lessons	In this topic, students will continue their study of nonlinear functions as they investigate square root, cubic, cube root, and step functions. They will investigate these new function families using different representations, including tables, graphs, and equations. They will also explore transformations of some of these function types and identify the zeros of cubic functions when the functions are given in factored form and connect the zeros to the ***x***-intercepts of the graph of the function.	*While this topic does not directly align to Algebra I standards, it is included as a way to foreshadow work students will encounter in Algebra II. You might choose to expose your students to the concepts addressed in these topics after you have addressed all of your district's required Algebra I curriculum.*