THE SCHOOL DISTRICT OF LEE COUNTY

Quarterly Content Guide 2014-2015
Algebra 1 (1200310)

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

(Q1.A) **Relationships Between Quantities** Aug. 18th – Aug. 27th (3 – 5 block days)	**(Q1.C Q2.A)** **Maneuvering & Graphing Linear Functions** Sept. 12th – Oct. 24th (14 – 16 block days)	**(Q3.A)** **Polynomials & Quadratics** Jan. 5th – Jan. 26th (6 – 8 block days)	(Q3.D) **Solving and Graphing Radical Equations** Feb. 27th – Mar. 18th (6 – 8 block days)
(Q1.B) **Linear Equations and Inequalities** Aug. 28th – Sept. 11th (4 – 6 block days)	**(Q2.B)** **Systems of Equations & Inequalities** Oct. 27th – Nov. 20th (7 – 9 block days)	**(Q3.B)** **Quadratic Functions** Jan. 27th – Feb. 18th (7 – 9 block days)	**(Q4.A)** **Solving Rational Functions** Mar. 19th – Apr. 14th (5 – 7 block days)
(Q1.C Q2.A) **Maneuvering & Graphing Linear Functions** Sept. 12th – Oct. 24th (14 – 16 block days)	**(Q2.C)** **Exponential Relationships and Functions** Nov. 21st – Dec. 18th (7 – 9 block days)	**(Q3.C)** **Special Functions & Key Features** Feb. 19th – Feb. 26th (2 – 4 block days)	**(Q4.B)** **Using Statistics to Make Sense of Data** Apr. 15th – May 8th (8 – 10 block days)
Quarter 1 – 21 Block Days	Quarter 2 – 23 Block Days	Quarter 3 – 23 Block Days	Quarter 4 – 21 Block Days

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course, and together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. This unit builds on these earlier experiences by asking students to analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations. All of this work is grounded on understanding quantities and on relationships between them. Skills To Maintain: *Reinforce understanding of the properties of integer exponents. The initial experience with exponential expressions, equations, and functions involves integer exponents and builds on this understanding.*

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Unit 3- Descriptive Statistics: This unit builds upon students' prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions—absolute value, step, and those that are piecewise-defined.

Additional Course Information	Professional Development	Helpful Websites
SKILLS TO MAINTAIN (Unit 1): Reinforce understanding of the properties of integer exponents. The initial experience with exponential expressions, equations, and functions involves integer exponents and builds on this understanding. **FLUENCY RECOMMENDATIONS:** Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables). **A-APR.1-** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent. **A-SSE.1b-** Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.	• **Math Practices by Grade Level** • ***Build Relationships: Teach More Than 'Just Math'*** • **Sorting Equations Video**: Research shows that formative assessments have a significant impact on student learning gains. This video is just one example of using formative assessment to inform instruction. • **CPALMS MFAS Training** • Research around formative assessment shows that students make greater learning gains when they are accountable for their own learning and the learning of their peers. The video, **Facilitating Peer Learning**, is a good example of a math classroom where students are engaged with one another. • **Five "Key Strategies" for Effective Formative Assessment** • ***Asking Good Questions & Promoting Discourse (Part 1).***	• Teaching Channel: Videos and Best Practices **https://www.teachingchannel.org/** • Illustrative Mathematics: Performance Tasks **https://www.illustrativemathematics.org/** • Inside Mathematics: Videos and Best Practices **http://www.insidemathematics.org/** • Khan Academy: Practice by Grade Level Standards **https://www.khanacademy.org/commoncore/map** • Shmoop: Math videos **http://www.shmoop.com/video/math-videos**
State Assessment Information	**District Progress Monitoring Information**	**General Resources**
• **FSA Portal** • **Training Tests Site** • **FSA Portal Information** • **Algebra 1 FSA Blueprint** • **Algebra 1 FSA Item Specifications** • **EOC Training Test Answer Key** • **Assessment Schedule 2014-2015** • **Calculator & Reference Sheet Policy**	• **Algebra 1 CCE Blueprint**	• **Team Mat** • **Find Someone Who Template**

Quarter: 1.A

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 3-5 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students begin to develop fluency in writing, interpreting, and translating between various forms of linear equations and expressions, as well as using various representations of expressions and equations to solve problems. Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in later units where students are factoring, completing the square, and performing other mindful algebraic calculations. Students also begin to extend what they've learned about solving and graphing linear equations in previous grades to relations and functions. This unit lays the groundwork for students' understanding quantities and relationships between them. A strong conceptual understanding of quantities will ensure student success as they move toward making sense of working with more abstract quantities.

Teacher Notes:

- Function notation should be explicitly taught in this unit. In addition, the connection between function notation and the range should be made to ensure students have a thorough understanding of the vocabulary and symbols used for functions.
- Help students make the connections stated in MAFS.912.N-RN.2.3 when performing operations. This includes explaining 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. The supplemental lesson plans provided thoroughly address this standard.

Teacher Professional Development:

Math Practices by Grade Level**:** Examine the progression of the mathematical practice standards by grade level to understand how students' knowledge of working with mathematics develops each year.

Set classroom expectations and create relationships from the beginning. ***Build Relationships: Teach More Than 'Just Math'***

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-CED.1:Create equations that describe numbers or relationships **MAFS.912.A-CED.1.1:** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. **MAFS.912.A-SSE.1: Interpret the structure of expressions.** **MACC.912.A-SSE.1.1:** Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.	**LAFS.910.WHST.1.1:**Write arguments focused on discipline-specific content. a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret as the product of *P* and a factor not depending on *P*.

MAFS.912.A-SSE.1.2: Use the structure of an expression to identify ways to rewrite it.

MAFS.912.F-IF.1: Understand the concept of a function and use function notation.

MAFS.912.F-IF.1.1: 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).*

MAFS.912.F-IF.1.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

MAFS.912.N-RN.2: Use properties of rational and irrational numbers.

MAFS.912.N-RN.2.3: 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.

c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
e. Provide a concluding statement or section that follows from or supports the argument presented.

Suggested Mathematical Practice Standards

MAFS.K12.MP.2.1: Reason abstractly and quantitatively.

- *Is there another way to write the equation or represent the problem?*
- *Explain how the equation represents the word problem.*

MAFS.K12.MP.7.1: Look for and make use of structure.

- *How can you apply what you know about linear equations to functions?*
- *How do replacement sets relate to real world problems?*

Big Idea(s)

Understanding Relationships Between Quantities

Essential Outcome Question(s)

In what ways can a mathematical situation be represented and how are these representations related?

<table>
<tr><th colspan="2">Aligned Learning Goals</th><th>District Adopted Materials</th><th>Supplemental Resources</th><th>Strategies for Differentiation</th></tr>
<tr><td rowspan="6">Making sense of relationships and quantities in expressions, equations, and functions</td><td>Interpret parts of expressions, equations, and functions</td><td rowspan="6">McGraw-Hill Algebra 1

Chapter 1, limiting Lesson 1-5 to example 1 only</td><td rowspan="6">MAFS.912.A-SSE.1.1: Lesson working with evaluating and manipulating expressions

MAFS.912.F-IF.1.1: Lesson Domain Representations

MAFS.912.N-RN.2.3: Lesson Plan for Rational and Irrational Numbers 1

MAFS.912.N-RN.2.3: Lesson Plan for Rational and Irrational Numbers 2</td><td rowspan="6"></td></tr>
<tr><td>Explain and apply properties of rational and irrational numbers</td></tr>
<tr><td>Use structure to rewrite expressions and equations</td></tr>
<tr><td>Evaluate equations and functions given a replacement set</td></tr>
<tr><td>Make connections among various representations of relations</td></tr>
<tr><td>Make sense of functions and their graphs</td></tr>
<tr><td colspan="5">Learning Objectives: Teacher Unit 1A Student Tracker Unit 1A</td></tr>
<tr><td colspan="5">Formative Assessment Options:
MFAS Tasks: A-SSE.1.1:
• Interpreting Basic Tax
• Dot Expressions
• What Happens?

MFAS Tasks: A-SSE.1.2:
• Finding Missing Values
• Quadratic Expressions
• Determine the Width
• Rewriting Numerical Expressions

MFAS Tasks: F-IF.1.1:
• Identifying Functions</td></tr>
<tr><td colspan="3">Summative Assessment(s)</td><td colspan="2">Progress Monitoring Assessment
Student Learning Objectives Data Tracker</td></tr>
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Quarter: 1.B

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 4-6 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will apply what they know about quantities and relationships in expressions and equations to solve linear equations and inequalities in various forms and write linear equations and inequalities for real-world contexts. Students will be building on solving one- and two-step equations learned in previous grade levels. Solving equations should encompass seeing structure in expressions so that all types of equations can be addressed in unity as opposed to teaching one-step, two-step, multi-step, and variables on both sides in isolation. In addition, students will be solving literal equations for a specified variable as an extension of understanding structure and using it to rewrite equations.

Teacher Notes:

- Ensure that students can thoroughly explain their thought process when solving equations.
- The Number & Quantity: Quantities standards are not explicitly addressed in the textbook. Familiarize yourself with these standards and begin to address units and quantities as they relate to solving algebraic problems in a variety of contexts. You may want to explore the descriptive modeling lesson in the supplemental resources to address standard N-Q.1.2.

Teacher Professional Development:

Five "Key Strategies" for Effective Formative Assessment, published by National Council of Teachers of Mathematics is a four-page article that outlines the research on formative assessment and the strategies needed to make formative assessment effective. This is a great article to read and discuss in a PLC.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-CED.1: Create equations that describe numbers or relationships. **MAFS.912.A-CED.1.1:** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. **MAFS.912.A-CED.1.3:** 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. **MAFS.912.A-CED.1.4:** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **MAFS.912.A-REI.1: Understand solving equations as a process of reasoning and explain the reasoning.** **MAFS.912.A-REI.1.1:** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the	**LAFS.910.RST.2.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. **LAFS.910.SL.1.3:** Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

MAFS.912.A-REI.2: Solve equations and inequalities in one variable.

MAFS.912.A-REI.2.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

MAFS.912.A-SSE.1: Interpret the structure of expressions.

MAFS.912.A-SSE.1.1: Interpret expressions that represent a quantity in terms of its context.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

MAFS.912.N-Q.1: Reason quantitatively and use units to solve problems.

MAFS.912.N-Q.1.1: 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.

MAFS.912.N-Q.1.2: Define appropriate quantities for the purpose of descriptive modeling.

MAFS.912.N-Q.1.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Suggested Mathematical Practice Standards

MAFS.K12.MP.3.1: Construct viable arguments and critique the reasoning of others.

- *Do you agree with that answer? Explain.*
- *Repeat what he/she said in your own words.*
- *How do you know what you are saying is true?*

MAFS.K12.MP.4.1: Model with mathematics.

- *What other ways could you use to model the situation mathematically?*
- *What connections can you make between different representations of the situation?*

MAFS.K12.MP.7.1: Look for and make use of structure.

- *How can you use what you know to explain why this works?*
- *What patterns do you see?*

Big Idea(s)

Writing and Solving Linear Equations and Inequalities

Essential Outcome Question(s)

How can writing an equation or inequality to model a real-world situation make solving problems easier?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Understand linear relationships and use them to represent and solve real-world problems	Solve linear equations, linear inequalities, and literal equations	*McGraw-Hill Algebra 1* Chapter 1, Lesson 1-3 Lab and Lesson 1-5, Examples 2-5 Chapter 2, Lessons 2-1 through 2-6 and Lessons 2-8 and 2-9 (omitting Lesson 2-7) Chapter 5, Lessons 5-1 through 5-5 (omitting Lesson 5-6)	**MAFS.912.A-CED.1.1: Lesson writing equations to model real-world situations & domain and range** **MAFS.912.A-REI.1.1: Lesson justifying steps to solving using differentiated instruction** **MAFS.912.N-Q.1.2: Lesson plan for descriptive modeling**	
	Explain and justify steps to solving linear equations and inequalities			
	Model real-world situations with equations and inequalities			
	Make sense of and choose appropriate quantities and units when solving			

Learning Objectives: **Teacher Unit 1B** **Student Tracker Unit 1B**

Formative Assessment Options:

MFAS Tasks: A-CED.1.1:
- **State Fair**
- **Music Club**
- **Quilts**
- **Follow Me**

MFAS Tasks: A-CED.1.3:
- **Sugar and Protein**
- **The New School**
- **Constraints on Equations**

MFAS Tasks: A-CED.1.4:
- **Solving Literal Equations**
- **Literal Equations**
- **Solving Formulas for a Variable**
- **Surface Area of a Cube**
- **Rewriting Equations**

MFAS Tasks: A-REI.1.1:
- **Justify the Process - 1**
- **Does it Follow?**
- **Justify the Process - 2**
- **Equation Logic**

Summative Assessment(s)	Progress Monitoring Assessment
	Student Learning Objectives Data Tracker

Quarter: 1.C and 2.A

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 14-16 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: Algebra I students will become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena. In this unit, students are building on the previous unit's topic of linear relationships, deepening their understanding by creating graphs from a variety of contexts, both mathematical and real world. In addition, students will write equations in a variety of forms to represent linear models presented in a variety of situations. Students will work with various representations of functions, manipulating them to model a situation, including those involving compositions of functions. Students will apply their knowledge of linear relationships to analyze data by making scatterplots, determining correlation coefficients, writing equations for a line of best fit, and distinguishing between correlation and causation for a data set.

Teacher Notes:

- Students need to be explicitly taught that the graph of a line is the visual representation of all the solution points for that function. This will help when making connections with systems of equations and inequalities and graphing other functions.
- When graphing linear functions, begin to help students understand transformations, e.g. adding 3 to the parent graph of $y = x$, moves the line up 3 units on the coordinate plane.
- To set the stage for finding rate of change for various functions, highlight that the rate of change over each specified interval is constant for every interval. This will help when students analyze the rate of change for exponential and quadratic functions over specified intervals.
- Arithmetic sequences are included in this unit because they are a special type of linear function. Help students make the connection between an arithmetic sequence and the linear functions they have been writing and graphing.
- When graphing situations with constraints on the domain or range, help students to identify and make sense of these constraints. They will use this knowledge when graphing functions in later chapters.

Teacher Professional Development:

Research around formative assessment shows that students make greater learning gains when they are accountable for their own learning and the learning of their peers. The video, **Facilitating Peer Learning**, is a good example of a math classroom where students are engaged with one another.

Standards	
Math Content Standards	Suggested Literacy Standards
MAFS.912.A-CED.1: Create equations that describe numbers or relationships. **MAFS.912.A-CED.1.2:** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **MAFS.912.A-REI.4: Represent and solve equations and inequalities graphically.**	**LAFS.910.WHST.2.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

MAFS.912.A-REI.4.10: 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).

MAFS.912.A-REI.4.12: 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.

MAFS.912.F-BF.1: Build a function that models a relationship between two quantities.

MAFS.912.F-BF.1.1: 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. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
c. Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.

MAFS.912.F-BF.2: Build new functions from existing functions.

MAFS.912.F-BF.2.3: Identify the effect on the graph of replacing *f(x)* by *f(x) + k, k f(x), f(kx),* and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

MAFS.912.F-IF.2: Interpret functions that arise in applications in terms of the context.

MAFS.912.F-IF.2.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

MAFS.912.F-IF.2.5: 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

Suggested Mathematical Practice Standards

MAFS.K12.MP.4.1: Model with mathematics.

- *Does your solution make sense?*
- *What do you know about the situation already?*

MAFS.K12.MP.6.1: Attend to precision.

- *How do you know your answer is accurate?*
- *Did you use the most efficient way to solve the problem?*

MAFS.K12.MP.8.1: Look for and express regularity in repeated reasoning.

- *What generalizations can you make?*
- *Can you find a shortcut to solve the problem? How would your shortcut make the problem easier?*

a factory, then the positive integers would be an appropriate domain for the function.
MAFS.912.F-IF.2.6: 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.
MAFS.912.F-IF.3: Analyze functions using different representations.
MAFS.912.F-IF.3.7a: 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.

MAFS.912.F-LE.2: Interpret expressions for functions in terms of the situation they model.
MAFS.912.F-LE.2.5: Interpret the parameters in a linear or exponential function in terms of a context.
MAFS.912.S-ID.2: Summarize, represent, and interpret data on two categorical and quantitative variables.
MAFS.912.S-ID.2.6: 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 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.

MAFS.912.S-ID.3: Interpret linear models.
MAFS.912.S-ID.3.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MAFS.912.S-ID.3.8: Compute (using technology) and interpret the correlation coefficient of a linear fit.
MAFS.912.S-ID.3.9: Distinguish between correlation and causation.

Big Idea(s)

Manipulating and Graphing Linear Functions

Essential Outcome Question(s)

In what ways are graphs useful for modeling real-world situations?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Create a deep understanding of linear relationships by analyzing their various representations	Graph linear equations and inequalities from a variety of contexts	*McGraw-Hill Algebra 1* Chapter 3, Lessons 3-1 through 3-3 and 3-5 through 3-6 (omitting lesson 3-4) Chapter 4, Lessons 4-1 through 4-6 (omitting Lesson 4-7) Chapter 5, Lesson 5-6 only	**MAFS.912.F-IF.2.4 & 2.5 & 2.6: Lesson for describing everyday situations using functions** **MAFS.912.F-BF.1.1c: Khan Academy lesson on composition of functions**	
	Understand and interpret graphs of linear equations and inequalities, including solutions and transformations			
	Recognize a variety of situations that increase linearly			
	Create linear equations and inequalities from a variety of contexts			
Analyze data relationships in linear situations	Apply knowledge of linear models to interpret data with and without technology			
	Determine how well data fits a relationship and distinguish between correlation and causation			

Learning Objectives: Teacher Unit 1C/2A **Student Tracker Unit 1C/2A**

Formative Assessment Options:

MFAS Tasks: F-BF.1.1:
- **Giveaway**
- **Saving for a Car**
- **How much Bacteria?**
- **Furniture Purchase**

MFAS Tasks: F-IF.2.4:
- **Elevation Along a Trail**
- **Uphill and Downhill**
- **Taxi Ride**
- **Bike Race**
- **Surfs Up**

MFAS Tasks: F-IF.2.5:
- **Height vs. Shoe Size**
- **Car Wash**
- **Describe the Domain**
- **Airport Parking**

MFAS Tasks F-IF.2.6:
- **Pizza Palace**
- **Identifying Rate of Change**
- **Estimating the Average Rate of Change**

MFAS Tasks F-IF.3.7:
- **Graphing a Linear Function**
- **Graphing a Step Function**
- **Graphing a Quadratic Function**
- **Graphing a Rational Function**
- **Graphing Exponential Functions**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 2.B

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 7-9 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will apply what they know about linear relationships to write, solve, and graph systems of linear equations and inequalities. Students will apply previous knowledge about graphing and solving to choose appropriate solution methods and will be able to justify solutions and estimate solutions from visual representations. Students will also deepen their understanding of constraints on the domain and range, if any, based on the solution of a problem.

Teacher Professional Development:
Five "Key Strategies" for Effective Formative Assessment, published by National Council of Teachers of Mathematics is a four-page article that outlines the research on formative assessment and the strategies needed to make formative assessment effective. This is a great article to read and discuss in a PLC.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-CED.1: Create equations that describe numbers or relationships. **MAFS.912.A-CED.1.3:** 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. **MAFS.912.A-REI.3: Solve systems of equations.** **MAFS.912.A-REI.3.5:** 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. **MAFS.912.A-REI.3.6:** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **MAFS.912.A-REI.4: Represent and solve equations and inequalities graphically.** **MAFS.912.A-REI.4.11:** 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. **MAFS.912.A-REI.4.12:** 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	**LAFS.910.RST.1.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. Suggested Mathematical Practice Standards **MAFS.K12.MP.1.1:** Make sense of problems and persevere in solving them. • *What is this problem asking?* • *Could someone else understand how to solve the problem based on your explanation?* **MAFS.K12.MP.5.1:** Use appropriate tools strategically. • *What math tools are available for finding the solution to a system of equations or inequalities?*

graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	

Big Idea(s)

Systems of Linear Equations & Inequalities

Essential Outcome Question(s)

- How are the different representations of systems related?
- What are similarities and differences between the solution of a system of equations and the solution(s) of a single linear equation?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Understand the connections between graphs, real-world contexts, and solutions of systems of linear equations and inequalities	Use multiple methods for solving and justifying systems of linear equations and inequalities	*McGraw-Hill Algebra 1* Chapter 6	**MAFS.912.A-CED.1.3: Lesson using real-life examples** **MAFS.912.A-CED.1.3: Additional practice on writing constraints** **MAFS.912.A-REI.3.6: Lesson Graphing vs. Substitution** **MAFS.912.A.REI.3: Lesson Solving Systems**	
	Understand and interpret graphs of systems of linear equations and inequalities			
	Create systems of linear equations and inequalities from a variety of contexts			
	Represent and interpret constraints for systems of linear equations and inequalities			

Learning Objectives: **Teacher Unit 2B** **Student Tracker Unit 2B**

Formative Assessment Options:

MFAS Tasks: A-CED.1.3:
- **Sugar and Protein**
- **The New School**
- **Constraints on Equations**

MFAS Tasks: A-REI.3.5:
- **Solutions Sets of Systems**
- **Adding Linear Equations**

MFAS Tasks: A-REI.3.6:
- **Apples and Peaches**
- **Solving a System of Equations 1**
- **Solving a System of Equations 2**
- **Solving a System of Equations 3**

MFAS Tasks: A-REI.4.11:
- **Graphs and Solutions**
- **Graphs and Solutions 2**
- **Using Tables**
- **Using Technology**

MFAS Tasks: A-REI.4.12:
- **Graphing Linear Inequalities**
- **Linear Inequalities in the Half-Plane**
- **Which Graph?**
- **Graph a System of Inequalities**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 2.C

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 7-9 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will expand their knowledge of integer exponents to include rational exponents. Expanding on their number sense from middle grades math, students will create a deep understanding of exponents, discovering properties of exponents and using properties to solve problems including expressions, equations, and scientific notation. Students will also be able to recognize exponential functions and be able to describe the rate of increase or decrease between set intervals. Students will be able to apply their knowledge of exponential functions to growth and decay models.

Teacher Notes:

- Students may need help in making the connection that sequences are functions, which is why they are an extension of units with similar functions.
- During this unit, students should make the connection that a quantity increasing exponentially eventually exceeds a quantity increasing linearly. Visual representations and comparisons allow students to draw such conclusions and also provide a vehicle for justifying their thinking.

Teacher Professional Development:

In order to best move instruction forward, teachers need to ask questions that encourage student discourse and reveal student thinking. For some tips and suggestions, read NCTM's article, ***Asking Good Questions & Promoting Discourse (Part 1).***

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-SSE.2: Write expressions in equivalent forms to solve problems. **MAFS.912.A-SSE.2.3:** 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. **MAFS.912.F-BF.1: Build a function that models a relationship between two quantities.** **MAFS.912.F-BF.1.1:** Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	**LAFS.910.RST.3.7:** Translate quantitative or technical information expressed in words in a text into visual form *(e.g., a table or chart)* and translate information expressed visually or mathematically *(e.g., in an equation)* into words. **LAFS.910.SL.1.2:** Integrate multiple sources of information presented in diverse media or formats *(e.g., visually, quantitatively, orally)* evaluating the credibility and accuracy of each source.
	Suggested Mathematical Practice Standards
	MAFS.K12.MP.1.1: Make sense of problems and persevere in solving them. • *How can you use an easier form of the problem to help make sense of it?* **MAFS.K12.MP.5.1:** Use appropriate tools strategically. • *Is using a calculator or mental math more appropriate for this situation?* • *How could you estimate the problem to check your work?*

MAFS.912.F-IF.1: Understand the concept of a function and use function notation.

MAFS.912.F-IF.1.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.

MAFS.912.F-IF.3: Analyze functions using different representations.

MAFS.912.F-IF.3.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

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

MAFS.912.F-LE.1: Construct and compare linear, quadratic, and exponential models and solve problems.

MAFS.912.F-LE.1.2: 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).

MAFS.912.F-LE.1.3: Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

MAFS.912.F-LE.2: Interpret expressions for functions in terms of the situation they model.

MAFS.912.F-LE.2.5: Interpret the parameters in a linear or exponential function in terms of a context.

MAFS.912.N-RN.1: Extend the properties of exponents to rational exponents.

MAFS.912.N-RN.1.1: 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.

MAFS.912.N-RN.1.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Big Idea(s)

Exploring Exponential Relationships and Functions

Essential Outcome Question(s)

- How does knowing properties of exponents, both integer and rational, help to streamline the process of solving math problems?
- How does the rate of change between two points for an exponential function differ from that of a linear function?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Fluently apply properties of exponents in a variety of contexts	Rewrite expressions and equations using properties of exponents, both integer and rational	*McGraw-Hill Algebra 1* Chapter 7, Lessons 7-1 through 7-7 (omitting Lesson 7-8)		
	Translate between radical expressions and rational expressions			
Understand and interpret exponential functions displayed in a variety of contexts	Understand and interpret graphs of exponential functions, including applying transformations			
	Create exponential functions, including growth and decay, from real-world contexts			
	Identify and create geometric sequences			

Learning Objectives: **Teacher Unit 2C** **Student Tracker Unit 2C**

Formative Assessment Options:

MFAS Tasks F-IF.3.8:

- **Launch from a Hill**
- **A Home for Fido**
- **Exponential Growth**
- **Exponential Decay**

MFAS Tasks F-LE.1.2:

- **Writing a Function from Ordered Pairs**
- **The Cost of Water**
- **Functions from Graphs**
- **Writing an Exponential Function from its Graph**
- **Writing an Exponential Function from a Description**
- **Writing an Exponential Function from a Table**
- **What is the Function Rule?**

MFAS Tasks F-LE.1.3:

- **Compare Linear & Exponential Functions**

MFAS Tasks F-LE.2.5:

- **Computer Repair**
- **Interpreting Exponential Functions**
- **Lunch Account**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 3.A

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 6-8 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will expand their knowledge of expressions and equations to include polynomial expressions and equations. They will use structure and knowledge of arithmetic properties to simplify polynomials and to perform addition, subtraction, and multiplication on polynomials. This work will lead to factoring and using factoring to simplify quadratic expressions and solve quadratic equations.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-APR.1: Perform arithmetic operations on polynomials. **MAFS.912.A-APR.1.1:** 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. **MAFS.912.A-APR.2: Understand the relationship between zeros and factors of polynomials.** **MAFS.912.A-APR.2.3:** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **MAFS.912.A-SSE.1: Interpret the structure of expressions.** **MAFS.912.A-SSE.1.1:** 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. For example, interpret as the product of *P* and a factor not depending on *P*. **MAFS.912.A-SSE.1.2:** 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 $(x^2 - y^2)(x^2 + y^2)$. **MAFS.912.A-SSE.2: Write expressions in equivalent forms to solve problems.** **MAFS.912.A-SSE.2.3:** 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. **MAFS.912.F-IF.3: Analyze functions using different representations.**	**LAFS.910.WHST.2.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Suggested Mathematical Practice Standards **MAFS.K12.MP.7.1:** Look for and make use of structure. • *What patterns do you see?* • *Can you look at the individual parts/terms of the polynomials to help solve the problem?* **MAFS.K12.MP.8.1:** Look for and express regularity in repeated reasoning. • *Are there generalizations you can make about multiplying binomials?* • *Why are some products of binomials referred to as special cases?*

MAFS.912.F-IF.3.8: 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.	

Big Idea(s)

Working with Polynomials & Quadratics

Essential Outcome Question(s)

When can a polynomial function be used to model and solve a real-world problem?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Understand the structure of and fluently perform operations on polynomials	Identify parts of polynomial expressions	*McGraw-Hill Algebra 1* Chapter 8, including all Exploration Algebra Labs		
	Perform operations on polynomial expressions			
Make connections between the structure of polynomials and using factoring to solve	Use polynomial identities to rewrite quadratic expressions			
	Solve quadratic equations by factoring			

Learning Objectives: **Teacher Unit 3A** **Student Tracker Unit 3A**

Formative Assessment Options:

MFAS Tasks A-APR.1.1:

- **Adding Polynomials**
- **Subtracting Polynomials**

MFAS Tasks A-APR.2.3:

- **Zeros of a Quadratic**

- **Multiplying Polynomials1**
- **Multiplying Polynomials 2**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 3.B

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 7-9 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students make connections between visual representations of quadratic functions and their algebraic representations. Students will learn a variety of additional methods to solve quadratic equations. Learning all types of solution methods will help students make associations to structure; seeing when one solution type is more favorable than another. Students will be able to identify key features of quadratic functions, making connections to similar key features with linear functions, and paving the way for future transformations on various functions.

Teacher Notes:

- Students need to be able to make the association between completing the square and the quadratic formula.
- Traditionally, rate of change is taught with linear models, but students also need to understand that rate of change can be found over specified intervals for all functions. This allows them to extend their knowledge about rate of change and draw conclusions regarding data and graphs of functions.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-APR.2: Understand the relationship between zeros and factors of polynomials. **MAFS.912.A-APR.2.3:** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **MAFS.912.A-REI.2: Solve equations and inequalities in one variable.** **MAFS.912.A-REI.2.4:** 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. **MAFS.912.F-BF.2: Build new functions from existing functions.** **MAFS.912.F-BF.2.3:** Identify the effect on the graph of replacing *f(x) by f(x) + k, k f(x), f(kx),* and *f(x + k)* for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an	**LAFS.910.RST.1.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **LAFS.910.RST.3.7:** Translate quantitative or technical information expressed in words in a text into visual form *(e.g., a table or chart)* and translate information expressed visually or mathematically *(e.g., in an equation)* into words. **Suggested Mathematical Practice Standards** **MAFS.K12.MP.4.1:** Model with mathematics. • *How does the graph of a quadratic function provide useful information for solving real-life problems?* **MAFS.K12.MP.5.1:** Use appropriate tools strategically. • *What is another way to find the zeros of a quadratic? Is one way more useful than another? Why or why not?*

explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

MAFS.912.F-IF.2: Interpret functions that arise in applications in terms of the context.

MAFS.912.F-IF.2.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

MAFS.912.F-IF.2.6: 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.

MAFS.912.F-IF.3: Analyze functions using different representations.

MAFS.912.F-IF.3.7: 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.

MAFS.912.F-IF.3.8: 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.

MAFS.912.A-SSE.2: Write expressions in equivalent forms to solve problems.

MAFS.912.A-SSE.2.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Big Idea(s)

Writing, Graphing, and Solving Quadratic Functions

Essential Outcome Question(s)

- Why do we use different methods to solve quadratic functions and how are these solutions related to the graph of the function?
- How does understanding key features and transformations help when writing and graphing quadratic functions?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Construct and graph quadratic functions, analyzing key features and using a variety of methods to find solutions, relating solutions to the graph	Solve quadratic equations by graphing, completing the square, and using the quadratic formula and recognize the importance of each solution method	*McGraw-Hill Algebra 1* Chapter 9, Lessons 9-1 through 9-5 and their Extended Algebra and Graphing Technology Labs (omitting Lessons 9-6 and 9-7 and their Extended Labs)		
	Create quadratic functions from a variety of contexts, including tables, graphs, and real-world scenarios			
	Graph quadratic functions, including applying transformations and explain key features of the graph			

Learning Objectives: **Teacher Unit 3B** **Student Tracker Unit 3B**

Formative Assessment Options:

MFAS Tasks A-REI.2.4:

- **Complete the Square - 1**
- **Complete the Square - 2**
- **Complete the Square - 3**
- **Quadratic Formula Part 1**
- **Quadratic Formula Part 2**
- **Which Strategy?**
- **Complex Solutions?**

MFAS Tasks F-IF.2.6:

- **Pizza Palace**
- **Identifying Rate of Change**
- **Estimating the Average Rate of Change**

MFAS Tasks F-IF.3.7:

- **Graphing a Linear Function**
- **Graphing a Step Function**
- **Graphing a Quadratic Function**
- **Graphing a Rational Function**
- **Graphing Exponential Functions**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 3.C

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 2-4 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students are applying what they know about transformations of linear and quadratic functions to square root, cube root, and absolute value functions. Visual representations build the foundation for the more abstract algebraic applications. Students will also learn about piecewise functions in this section and their role in linear situations. Students will identify whether mathematical and real-world situations model linear, quadratic, or polynomial models, helping them to understand that modeling with math for lends itself to assisting in solving similar problems and also more complex problems. In this unit, students will analyze various forms of functions for their key features, being able to compare and contrast similar features to help them solve problems.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.F-IF.3: Analyze functions using different representations. **MAFS.912.F-IF.3.7b:** 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 square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **MAFS.912.F-IF.3.9:** Compare properties of two functions 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, say which has the larger maximum.* **MAFS.912.F-LE.1: Construct and compare linear, quadratic, and exponential models and solve problems.** **MAFS.912.F-LE.1.1:** 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.	**LAFS.910.SL.1.3:** Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. **LAFS.910.SL.2.4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. **Suggested Mathematical Practice Standards** **MAFS.K12.MP.3.1:** Construct viable arguments and critique the reasoning of others. • *Explain how to use successive differences to identify functions.* **MAFS.K12.MP.8.1:** Look for and express regularity in repeated reasoning. • *What connections can you make among various functions?*

MAFS.912.F-LE.1.2: 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). **MAFS.912.F-LE.1.3:** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. **MAFS.912.F-BF.2:Build new functions from existing functions** **MAFS.912.F-BF.2.3:** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k, k f(x), f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	

Big Idea(s)

Graphing Special Functions and Comparing Key Features of Functions

Essential Outcome Question(s)

When are special functions used in real-world contexts?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Construct graphs for a variety of functions and compare and explain key features of functions represented in multiple contexts	Graph piecewise, absolute value, square root and cube root functions, including applying transformations and explain key features of their graphs	*McGraw-Hill Algebra 1* Chapter 9, Lessons 9-6 through 9-7 Chapter 10, Lesson 10-1, 10-1 Extend Graphing Technology Lab (omitting Lessons 10-2 through 10-6)		
	Compare features of two functions of either like type of different types when given in a variety of contexts			
	Distinguish between situations that can be modeled with linear functions, quadratic functions, and with exponential functions.			

Learning Objectives:	**Teacher Unit 3C**	**Student Tracker Unit 3C**

Formative Assessment Options:

MFAS Tasks F-IF.3.9:

- **Comparing Linear and Quadratic Functions**
- **Comparing Quadratic Functions**

MFAS Tasks F-LE.1.1:

- **How Does Your Garden Grow?**

Summative Assessment(s)	**Progress Monitoring Assessment**

Quarter: 3.D

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 6-8 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will extend their knowledge of exponents and general number sense in working with radicals. Students will be able to simplify radical expressions and perform operations with radicals. Students will apply what they learn about radical operations to solve radical functions.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-REI.2: Solve equations and inequalities in one variable. **MAFS.912.A-REI.2.4:** 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. **MAFS.912.N-RN.1: Extend the properties of exponents to rational exponents.** **MAFS.912.N-RN.1.2:** Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**LAFS.910.RST.1.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
	Suggested Mathematical Practice Standards
	MAFS.K12.MP.1.1: Make sense of problems and persevere in solving them. • *How is solving a radical equation like solving a linear equation?* • *Why do some solutions not work for radical equations?* **MAFS.K12.MP.6.1:** Attend to precision. • *Why are some solutions left in radical form and others simplified?* • *What degree of accuracy is needed for the solution?*

Big Idea(s)

Solve and Graph Radical Equations

Essential Outcome Question(s)

What connections can be made between simplifying expressions and polynomials and simplifying radical expressions?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Simplify radical expressions and solve radical equations	Simplify and perform operations on radical expressions	*McGraw-Hill Algebra 1* Chapter 10, Lessons 10-2 through 10-4 and 10-3 Extended Algebra Lab (omitting Lessons 10-1 and 10-5 and 10-6)		
	Solve radical functions in mathematical and real-world contexts			

Learning Objectives: **Teacher Unit 3D** **Student Tracker 3D & 4A**

Formative Assessment Options:

MFAS Tasks A-REI.2.4:

- **Complete the Square - 1**
- **Complete the Square - 2**
- **Complete the Square - 3**
- **Quadratic Formula Part 1**
- **Quadratic Formula Part 2**
- **Which Strategy?**
- **Complex Solutions?**

MFAS Tasks N-RN.1.2:

- **Rational Exponents 1**
- **Rational Exponents 2**
- **Rational Exponents 3**
- **Rational Exponents 4**

Summative Assessment(s)	**Progress Monitoring Assessment**

Quarter: 4.A

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 5-7 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students will extend their knowledge of constraints to rational functions as they solve and graph. Students will apply their knowledge of polynomials to perform operations on and simplify rational expressions. This unit brings together many of the concepts students have been building upon all year. With a solid foundation in conceptual knowledge of key algebraic concepts, students apply what they know to more complex situations.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.A-CED.1: Create equations that describe numbers or relationships. **MAFS.912.A-CED.1.2:** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	**LAFS.910.RST.1.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
	Suggested Mathematical Practice Standards
	MAFS.K12.MP.3.1: Construct viable arguments and critique the reasoning of others. • *How can you use precise language to explain how to graph a rational function?* • *Do you agree with _____'s answer?* • *Can you re-explain _____'s solution method?*

Big Idea(s)

Understanding and Solving Rational Functions and Equations

Essential Outcome Question(s)

How does analyzing the structure of an expression or equation help you simplify and solve more complex problems?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Use structure to make sense of and solve and graph rational functions and equations	Make connections between the structure of factored quadratics and polynomials in order to see structure in, and simplify, rational functions	*McGraw-Hill Algebra 1* Chapter 11, Lessons 11-2, 11-3, 11-4, and 11-8 (omitting Lessons 11-1 and 11-5 through 11-7)		
	Solve rational functions and equations			
	Graph rational functions, identifying asymptotes			

Learning Objectives **Teacher Unit 4A** **Student Tracker Unit 3D & 4A**

Formative Assessment Options:

MFAS Tasks A-CED.1.2:

- **Tech Repairs**
- **Tee It Up**
- **Trees in Trouble**
- **Hotel Swimming Pool**
- **Tech Repair Graph**
- **Loss of Fir Trees**
- **Model Rocket**

Summative Assessment(s)	Progress Monitoring Assessment

Quarter: 4.B

Academic Plan 2014-2015
Algebra 1 (1200310)

Pacing Range: 8-10 block days

Adopted Instructional Materials: *McGraw-Hill Algebra 1*

Description of this Unit: In this unit, students continue to analyze data, extending their knowledge of linear situations and what they learned in middle grades about measures of center. Students will be able to compare data sets, identify distributions types, and create graphs of data including box-and-whisker plots and line plots.

Standards

Math Content Standards	Suggested Literacy Standards
MAFS.912.S-ID.1: Summarize, represent, and interpret data on a single count or measurement variable. **MAFS.912.S-ID.1.1:** Represent data with plots on the real number line (dot plots, histograms, and box plots). **MAFS.912.S-ID.1.2:** 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. **MAFS.912.S-ID.1.3:** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **MAFS.912.S-ID.2: Summarize, represent, and interpret data on two categorical and quantitative variables.** **MAFS.912.S-ID.2.5:** 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.	**LAFS.910.SL.1.2:** Integrate multiple sources of information presented in diverse media or formats *(e.g., visually, quantitatively, orally)* evaluating the credibility and accuracy of each source. **LAFS.910.WHST.3.9:** Draw evidence from informational texts to support analysis, reflection, and research. **Suggested Mathematical Practice Standards** **MAFS.K12.MP.2.1:** Reason abstractly and quantitatively. • *How does knowing the standard deviation allow you to analyze a situation more accurately than with just a measure of center?* **MAFS.K12.MP.4.1:** Model with mathematics. • *How could we model a data set?* • *How does the model help to make sense of the problem?*

Big Idea(s)
Using Statistics to Make Sense of Data
Essential Outcome Question(s)
How are various statistical measures used to interpret data?

Aligned Learning Goals		District Adopted Materials	Supplemental Resources	Strategies for Differentiation
Make connections among various statistical measures of center and use these measures to interpret data	Understand measures of center and spread	*McGraw-Hill Algebra 1* Chapter 12, Lessons 12-1 through 12-4 and Algebra Lab 12-7 (omitting Lessons 12-5 through 12-8)		
	Create graphs and explain shape, distribution, and center			
	Look for trends, interpret frequencies, and summarize categorical data in context for two categories in two-way frequency tables			

Learning Objectives: **Teacher Unit 4B** **Student Tracker Unit 4B**

Formative Assessment Options:

MFAS Tasks S-ID.1.1:
- **A Tomato Garden**
- **Flowering Trees**
- **Winning Seasons**
- **Trees in the Park**

MFAS Tasks S-ID.1.2:
- **How Many Jeans?**
- **Texting During Lunch**
- **Texting During Lunch Histograms**

MFAS Tasks S-ID.1.3:
- **Using Centers to Compare Tree Heights**
- **Using Spread to Compare Tree Heights**
- **Comparing Distributions**
- **Total Points Scored**

MFAS Tasks S-ID.2.5:
- **Breakfast Drink Preference**
- **Who is a Vegetarian?**
- **Conditional Relative Frequency**
- **Marginal and Joint Frequency**

Summative Assessment(s)	Progress Monitoring Assessment