Unit 1.1 Equations

Quarter 1

Section	Days	Lesson Notes
1.1	1	Variables and Expressions
1.2 – 1.3	1	Solving Equations by Addition, Subtraction, Multiplying or Dividing
1.4	1	Solving Two-Step and Multi-Step Equations
1.5	2	Solving Equations with Variables on Both Sides
1.6	3	Solving for a Variable
1.7	3	Solving Absolute-Value Equations (It is important to graph absolute-value equations)

Unit:1.1	Equations	Days : 11

Essential Questions
How do you interpret, evaluate and write algebraic expressions that model real-world situations? What are some of the different methods for solving linear equations? How can you use properties to justify solutions to equations that involve multiplication and division? How can you justify solutions to multi-step equations? How can you use properties to justify solutions to equations that have variables on both sides? How do you solve literal equations and rewrite formulas? How can you use graphing to solve equations involving absolute value?

Content to be Learned	Skills
Students will learn to multi-stepped equations including equations with variables on both sides. Students will be able to identify the properties used in each step to justify the solutions.	Identify and create examples or real number system properties. Identifying the components of an equation in order to combine like terms and thereby isolate a variable to find its solution. Justify the solution to an equation by identifying the properties used to solve it.
Assessments	**Standards**
Formative Assessments Quizzes Chapter Tests Common Tasks	A.SSE.1 A.SSE.1a A.SSE.1b A.REI.1 A.REI.3 A.REI.11 A.CED.2 A.CED.4
Sample Instructional Activities	**Resources**
Chapter 1 Equations	"Explorations in Core Math For Common Core" Algebra Textbook Lessons

Unit 1.1	**Variables and Expressions**	**Lesson 1 of 6**	**Days 1**
Lesson Focus			
1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.SSE.1 A.SSE.1a A.SSE. 1b A.SSE. 2	Students will be able to identify the terms and their coefficients in an expression. Students will be able to write expressions given a written scenario. Students will be able to evaluate expressions given the value of variables.	Standard 7 Look for and make use of structure.	How do you interpret, evaluate and write algebraic expressions that model real-world situations?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solve one step equations. Order of Operations Operations with Integers	Variable Constant Coefficient 'Like Terms' Terms Expression Equation Evaluate	Students often fail to recognize that subtraction of a negative number results in the addition of that number. When writing expressions given a sentence, students often confuse the order of terms when using subtraction and division.(IE. Seven less than a number is n-7).	Explorations in Core Mathematics – Algebra Lesson 1.1
Suggested Learning Practices			
9. Instruction Practices (What are the teachers doing)		**10. Learning Practices (What are the students doing)**	
Teachers are ensuring students' mastery of writing expressions to represent situations. Special attention to use of the order of operations will ensure students have success. (*Some problems address the use of tax or tips using percent, teachers should be verifying students understand to convert percent to decimal values).		Students are writing algebraic expressions which represent real world applications.	

Unit 1.1	Solving Equations by Adding, Subtracting, Multiplying and Dividing	Lesson 2 of 6	Days 1

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.1 A.REI.3	Students learn to solve equations by isolating a variable. Students will use multiple strategies to solve the problem. Students will identify the property which justifies each step used to solve the problem.	Standard 3. Construct viable arguments and critique the reasoning of others. Standard 6 Attend to precision.	What are some different methods for solving linear equations? How can you use properties to justify solutions to equations that involve adding, subtracting, multiplication and division?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Problem solving strategies such as guess and check, work backwards and logical thinking.	Expressions Equivalent Equations Add/Sub Property of Equality Inverse Property of Addition Identity Property of Addition Associative Property of Addition Mult/Div Property of Equality Inverse Property of Multiplication Identity Property of Multiplication Associative Property of Multiplication	Students sometimes use the operation in the equation instead of the inverse operation. Students often do not understand that the solution they find can be checked by substituting that value in for the unknown variable in the original problem. Students often do not understand that a fraction can be eliminated from the problem if multiplied by its reciprocal. Students often have difficulty isolating a variable if it is the numerator ie. $\frac{x}{5} = 20$	Explorations in Core Mathematics – Algebra Lesson 1.2 and 1.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the steps used to solve equations. They are demonstrating that solving equations is like balancing an equation.	Students are identifying the unknown in the problem and using inverse operations to isolate the variable. Students are evaluating the reasonableness of their conclusion and checking their answers.

Unit 1.1	Solving Two-Step and Multi-Step Equations	Lesson 3 of 6	Days 1

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.1 A.REI.3	Students learn to solve equations by isolating a variable. Students will use multiple strategies to solve the problem. Students will identify the property which justifies each step used to solve the problem. Students will recognize that some problems may result in no solution.	Standard 7 Look for and make use of structure. Standard 6 Attend to precision.	How can you use properties to justify solutions to multi-stepped equations?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving one-step equations. Use Distributive Property	Combining 'like' terms Distributive Property	Students often neglect to combine like terms on the right side of the equation and then on the left side of the equation BEFORE using the Add/Sub Prop of Equality and the Mult/Div Prop of Equality. When an equation require using the distributive property, students often forget to distribute to all the terms inside the parentheses. ie. $5x + 2(3x - 1) = 31$	Explorations in Core Mathematics – Algebra Lesson 1.4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the steps used to solve equations. They are demonstrating that solving equations is like balancing an equation.	Students are identifying the unknown in the problem. Then they are using inverse operations to isolate the variable. Students are evaluating the reasonableness of their conclusion and checking their answers.

Unit 1.1	Solving Equations with Variables on Both Sides	Lesson 4 of 6	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.1 A.REI.3	Students learn to solve equations by isolating a variable. Students will use multiple strategies to solve the problem. Students will identify the property which justifies each step used to solve the problem. Students will recognize that some problems may result in no solution.	Standard 7 Look for and make use of structure. Standard 6 Attend to precision.	How can you use properties to justify solutions to equations with variables on both sides?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving one-step equations. Solving multi-stepped equations. Use Distributive Property	Combining 'like' terms Distributive Property	Student are able to distinguish that a problem has variables on both sides yet they often fail to recognize that all the constants need to be on one side of the equal sign and the variables on the other side. More often than not, students fail to recognize that the number 0 can be an actual solution.	Explorations in Core Mathematics – Algebra Lesson 1.5

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the steps used to solve equations. They are demonstrating that solving equations is like balancing an equation.	Students are identifying the unknown in the problem. They are combining 'like' terms. They are combining 'like' terms once they have gotten all the variables on one side of the equal sign and constants on the other. Then they are using inverse operations to isolate the variable. Students are evaluating the reasonableness of their conclusion and checking their answers.

Unit 1.1	**Solving for a Variable** (Literal Equations)	**Lesson 5 of 6**	**Days 3**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.2 A.CED.4 A.REI.1 A.REI.3	Students will solve literal equations for a specific variable. Students will demonstrate a variety of formats for specific formula or equation. ie. ($y = mx + b$ or $b = y - mx$ or $x = \frac{y-b}{m}$)	Standard 7 Look for and make use of structure. Standard 6 Attend to precision.	How can you solve literal equations and rewrite formulas?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Order of Operations Solving one-step equations. Solving multi-stepped equations.	Literal Equation Formula Isolating a variable	Students may fail to recognize the similarity in solving literal equation and the similarity in solving multi-stepped equations. A graphic organizer demonstrating the steps to solve an equation in one column compared to the steps to solve the literal equation in the second column may boost understanding.	Explorations in Core Mathematics – Algebra Lesson 1.6

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers are modeling the steps used to solve literal equations.	Students are isolating a specific variable to rewrite a formula in a new format.

Unit 1.1	Solving Absolute Value Equations	Lesson 6 of 6	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.1 A.CED.2 A.REI.1 A.REI.11	ONLY TEACH the skill of solving basic absolute value equations. Students will learn to solve basic absolute value problems. ie. $\lvert x\rvert = 5$ $\lvert 2x + 1\rvert = 9$ $4\lvert x - 2\rvert = 8$	Standard 7 Look for and make use of structure. Standard 6 Attend to precision.	How can you use graphing to solve equations involving absolute value?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Integer representation on a number line. Operations with Integers. Solving multi-stepped equations.	Absolute Value	For many students, this is the first time the solving of equations will result in two answers. Most will neglect to find both solutions. Students also often fail to recognize that any absolute value equation which equals a negative number results in the problem having no solution.	Explorations in Core Mathematics – Algebra Lesson 1.7

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling solving and graphing absolute value equations.	Students are finding both solutions for absolute value equations and graphing them.

Unit 1.2 Inequalities

Quarter 1

Section	Days	Lesson Notes
2.1	2	Graphing and Writing Inequalities
2.2 – 2.3	1	Solving Inequalities by Adding, Subtracting, Multiplying, or Dividing
2.4	2	Solving Two-Step and Multi-Step Inequalities
2.5	1	Solving Inequalities with Variables on Both Sides
2.6	3	Compound Inequalities

Unit: 1.2	Inequalities	Days : 9

Essential Questions
How can you represent relationships using inequalities? How can you use properties to justify solutions to inequalities involving addition, subtraction, multiplication and/or division? How can you use properties to justify solutions to multistep inequalities? How can you use properties to justify solutions to inequalities with variables on both sides? How can you solve special compound inequalities?

Content to be Learned	Skills
The student will be able to: find a solution set given a replacement set for an inequality represent inequalities algebraically solve simple, multi-step and compound using properties to justify graph simple, multi-step and compound inequalities and express solutions using set notation solve real world problems by writing inequalities	Solve and graph inequalities by isolating the variable Interpret key words indicating inequality in real world situations Use properties to justify solutions to inequalities Express solutions in set notation
Assessments	**Standards**
Formative Assessments Quizzes Unit Test	CC.9-12. N.Q.2 CC.9-12.A.CED. 1,3 CC.9-12.A.REI.3
Sample Instructional Activities	**Resources**
	Explorations in Core Math for the Common Core Algebra 1

Unit 1.2	Graphing and Writing Inequalities	Lesson 1 of 5	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12.N.Q. 2 CC 9-12.A. CED. 1 CC. 9-12. A CED . 3	Creating inequalities to model situational problems Proving if a value is a solution to a given inequality	Standard 2: Reason abstractly and quantitatively	How can you represent relationships using inequalities?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Writing Expressions Writing Equations Solving Equations	Inequality Solutions of an Inequality	Trouble selecting the symbol when translating from a verbal sentence.(Words at least indicate less than and at most indicates greater than) Writing solution as an equation has the same meaning	Explorations in Core Mathematics – Algebra Lesson 2.1

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Creating a list of words that indicate inequality symbols Demonstrate proving whether a number is a solution to an inequality Modeling writing inequality to represent situational problems	Familiarizing themselves with key words that indicate which inequality correctly models the situation Practice defining variables and writing inequalities Testing values to see if they are solutions to a given inequality to enable them to check the solutions they obtain when they solve inequalities

Unit 1.2	Solving Inequalities by Adding, Subtracting, Multiplying or Dividing	Lesson 2 of 5	Days 1

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12. A REI.3	Using inverse operations to isolate the variable and solve inequalities .Represent the solutions to inequalities on number line. Apply the properties to justify the steps involved in solution of inequality. Effect of Multiplying or Dividing both sides of an inequality by a negative number which necessitates reversing the inequality symbol.	Standard 6: Attend to precision Standard 2: Reasons abstractly and quantitatively	How can you use properties to justify solutions to inequalities that involve addition, subtraction, multiplication and division?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving equations by adding and subtracting Graphing and writing inequalities	Set Notation	Using same operation instead of inverse to solve inequality. Reversing the direction of the inequality symbol when there is any negative number in the inequality. Or Reversing the inequality symbol when multiplying or dividing by any number.	Explorations in Core Mathematics – Algebra Lesson 2.2 – 2.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Modeling justification of steps in solving an inequality by listing properties used Solid circle vs Open circle in the graphing of inequalities Demonstrate proper inequality set notation Demonstrate to students the effect of multiplying or dividing both sides of an numerical inequality by a negative number to cause them to think about the reasoning behind the rule and not just blindly follow the rule Encourage students to check their solutions by substituting a value from the solution set into the original inequality	Applying properties to the solution of inequalities Isolating variable to solve inequalities Represent inequality solutions on a number line Differentiating empty circle vs open circle and their meaning in graphing inequalities Using set notation to express inequality solutions Practicing solving inequalities by multiplying or dividing both sides Reinforcing : - the use of properties to justify the steps - graphing inequalities - proper use of set notation to express an inequality solution

Unit 1.2	Solving Two-Step and Multi-Step Inequalities	Lesson 3 of 5	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC 9-12. A.REI.3	Applying the properties in the correct order to facilitate solving inequalities with more than 1 step	Standard 2: Reason abstractly and quantitatively	How can you use the properties to justify solutions to multi-step inequalities
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving Multi-step equations		Failing to isolate the variable term prior to dividing by the coefficient	Explorations in Core Mathematics – Algebra Lesson 2.4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the process of solving multi-step inequalities by demonstrating how it combines the steps of solving multi-step equations with the rules of solving inequalities Teachers are encouraging students to check their answer by substituting a value from the solution set into the original inequality Teachers are providing extra examples if necessary	Independently or in groups students are solving, graphing, justifying the steps using properties and expressing their solution in set notation for multi-step inequalities,

Unit 1.2	Solving Inequalities with Variables on Both Sides	Lesson 4 of 5	Days 1

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12. A.REI .3	Getting variables combined on one side of the inequality symbol	Standard 2: Reason abstractly and quantitatively	How can you use properties to justify solutions to inequalities with variables on both sides?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving inequalities by Adding, Subtracting, Multiplying, and Dividing Solving two step and multistep inequalities		In order to express correctly in set notation (and facilitate correct graphing), the variable must be on the left side of the inequality symbol – forgetting to flip symbol when multiplying or when switching changing the order to properly express in set notation	Explorations in Core Mathematics – Algebra Lesson 2.5

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the steps to solving inequalities with variables on both sides. The organization of the Practice exercises on page 96 provide good structure for the solving, justification, set notation and graphing	Practicing solving inequalities with variables on both sides. Students are not learning new content just completing more complex inequalities which require more steps and more justification

Unit 1.3 Introduction to Functions

Quarter 1

Section	Days	Lesson Notes
3.1	3	Graphing Relations Students must continue to practice and master the skill of describing a situation that represents a given graph as well as creating graphs that model given situations as practiced in this section. Students should be given these problems as much as possible until mastery is met. (Reiterate this throughout the next sections if necessary.)
3.2	2	Relations and Functions
3.3	2	Operations with Functions and Inverse Functions (Introduce only, not for mastery)
4.1	3	Identifying Linear Functions Distinguish discrete/continuous functions, including domain and range. Create tables and graphs using functions.
3.4	3	Graphing Piecewise Functions (This section was moved here because students were exposed to evaluating functions in section 4.1)
4.2	2	Using intercepts of linear equations, create tables and graphs. *Standard Form is used. Graph vertical and horizontal lines.

Unit:1.3	**Introduction to Functions**	**Days : 15 (plus another 11 days in beginning of Quarter 2)**

Essential Questions

How are linear functions used in the real world and how are they helpful to make predictions regarding the future trend of data?
How do you use operations to combine functions.
How do you represent functions?
How can you use operations to combine functions and how can you find inverses of functions?
What is a discrete linear function and how are discrete and continuous linear functions alike and how are they different?
How are piecewise functions and their graphs different from other functions?
How can you use intercepts to graph the solutions to a linear equation in two variables?

Content to be Learned	**Skills**
Preform operations with functions, including inverse operations. **Create linear functions, tables and graphs given specific parameters.** **Represent functions as tables, graphs, and mappings.** **Identify discrete versus continuous data.** **Graph and identify domain and range of piecewise functions.** **Graph linear functions using x and y intercepts.**	**Solve equations, identify patterns, and make predictions.** **Translate algebraic patterns from tables to graphs to equations and back.** **Perform operations with functions, including determining inverse functions.**
Assessments	**Standards**
Formative Assessments **Quizzes** **Chapter Tests** **Common Tasks**	**F.BF.1, F.BF.1b, F.BF.4a** **F.IF.2, F.IF.3, F.IF.5, F.IF.6, F.IF.7a and 7b, F.IF.9** **F.LE.2** **A.CED.2** **A.REI.10, A.REI.11**
Sample Instructional Activities	**Resources**
	Explorations in CORE Math – Algebra Textbook Lessons **Springboard Algebra Activities**

Unit 1.3	Graphing Relations	Lesson 1 of 10	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
F.BF.1b F.BF.4a	Perform operations with functions	Standard 4: Model with Mathematics	How can you use operations to combine functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Function Notation and evaluating functions for specific input.	Function, Function Notation, function rule, independent and dependent variable	Students often master addition easily but have more difficult time with subtraction and multiplication since they forget to distribute to the second and any subsequent terms in the second function.	Explorations in CORE Math – Algebra Textbook Lesson 3.1

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling operations with functions. Teachers focus on substitution of a function's rule (the algebraic expression that defines a function) into the combined functions using addition, subtraction and multiplication. ***** Students must continue to practice and master the skill of describing a situation that represents a given graph as well as creating graphs that model given situations as practiced in this section. Students should be given these problems as much as possible until mastery is attained. (Reiterate this throughout the next sections if necessary).**	Students are attempting problems using operations with functions. Students are substituting in the function rule into the combined functions and are performing the specific operation delineated for that problem.

Unit 1.3	Graphing Relations	Lesson 1 of 10	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
F.BF.1b F.BF.4a	Perform operations with functions	Standard 4: Model with Mathematics	How can you use operations to combine functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Function Notation and evaluating functions for specific input.	Function, Function Notation, function rule, independent and dependent variable	Students often master addition easily but have more difficult time with subtraction and multiplication since they forget to distribute to the second and any subsequent terms in the second function.	Explorations in CORE Math – Algebra Textbook Lesson 3.1

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling operations with functions. Teachers focus on substitution of a function's rule (the algebraic expression that defines a function) into the combined functions using addition, subtraction and multiplication. ***** Students must continue to practice and master the skill of describing a situation that represents a given graph as well as creating graphs that model given situations as practiced in this section. Students should be given these problems as much as possible until mastery is attained. (Reiterate this throughout the next sections if necessary).**	Students are attempting problems using operations with functions. Students are substituting in the function rule into the combined functions and are performing the specific operation delineated for that problem.

Unit 1.3	Relations and Functions	Lesson 2 of 10	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
N.Q.1 F.IF.1 F.IF.2 F.IF.5	Representing functions as tables, graphs, and mappings.	Standard 2: Reason Abstractly and Quantitatively	How do you represent functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Evaluating expressions	Function Domain Range Function notation Independent variable Dependent variable Function rule	Students believe incorrectly that functions must be represented by equations. It is important to stress relations and functions as ordered pairs to help avoid this misconception. Some students confuse domain and range. Tell students that alphabetically *domain* comes before *range*, just as *x*-values come before *y*-values in an ordered pair. This may help students connect the domain to the *x*-values and the range to the *y*-values.	Explorations in CORE Math – Algebra Textbook Lesson 3.2

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Introduce students to functions using concepts and data which they are familiar. Facilitate as students move through the lesson. Provide opportunities for groups to share out.	Working cooperatively or independently through the lesson. Creating mappings, tables and graphs and deciphering whether or not they represent functions. Practice with additional problems provided by the teacher.

Unit 1.3	**Operations with Functions and Inverse Functions** (Introduce only, not for mastery)	**Lesson 3 of 10**	**Days 2**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.APR.1 F.BF.1b A.CED.2 F.BF.4 F.IF.1 F.BF.4a F.IF.2 F.LE.2 F.BF.1 F.LE.5 F.BF.1a	Perform operations with functions Adding linear models Multiplying linear models Using inverse operations to find inverse functions Finding inverse by solving $y = f(x)$ for *x*. Finding inverses of real-world functions	Standard 4: Model with Mathematics	How can you use operations to combine functions and how can you find inverses of functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Operations with functions	Inverse of a function	Some students may have difficulty following the steps used to find the inverse of a function. You may want to describe an inverse function as one that "undoes" a function. Show students that you can find the inverse of a function by undoing the operations that have been done to *x*, but in the reverse order of the order of operations.	Explorations in CORE Math – Algebra Textbook Lesson 3.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Facilitate as students move through the lesson, modeling when necessary. Provide extra practice.	Working cooperatively or independently through the lesson. Practice with additional problems provided by the teacher.

Unit 1.3	Identifying Linear Functions	Lesson 4 of 10	Days 3
Lesson Focus			
1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
F.IF.2 F.IF.3 F.IF.5 F.IF.9	Identify Discrete versus Continuous Data. Create tables/graphs from functions and vice versa.	Standard 2 Reason Abstractly and Quantitatively	What is a discrete linear function and how are discrete and continuous linear functions alike and how are they different?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Create tables of data given a function. Create and label a graph of data from a table and/or a function. Create a function from a table or a graph.	Discrete versus Continuous Data Domain and Range 'a reasonable domain' linear y-intercept	*** Some students may not have mastered creating linear functions from a table/graph. This may require a mini-lesson for review OR even more time. *** Students struggle to recognize domain and range from a graph of data. *** Students most often confuse discrete and continuous data when given a real world context using units. (i.e. Apples sold individually versus Apples sold by the pound).	Explorations in CORE Math – Algebra Textbook Lesson 4.1

Suggested Learning Practices	
9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers are modeling examples of how to create a table and graph from a function. Teachers are concentrating on having students create a function from a table and/or a graph. Teachers provide multiple examples of discrete versus continuous data.	Students are counting intervals to find the slope given a linear graph Students are using the slope formula given 2 points to find the slope Finding the slope given a table Classifying the slopes of lines.

Unit 1.3	Graphing Piecewise Functions	Lesson 5 of 10	Days 3
Lesson Focus			
1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.2 F.IF.2 F.IF.7b F.BF.1	Graph and identify domain and range of piecewise functions.	Standard 4: Model with Mathematics	How are piecewise functions and their graphs different from other functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graph Linear Functions Identify the domain and range for a specific interval of a piecewise function.	Piecewise Function Interval Independent/Dependent Variable	Students may have difficulty determining what is occurring in a real work application when graphs of piecewise data are horizontal or vertical.	Explorations in CORE Math – Algebra Textbook Lesson 3.4

Suggested Learning Practices	
9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers are modeling real world application which encounter piecewise functions. (I.e. Breakfast with Bowser Activity from Springboard Algebra text). Teachers are indentifying intervals of piecewise functions Teachers are identifying the domain and range of specific intervals of piecewise data.	Students are using real world applications to identify and create piecewise functions. Students are graphing piecewise functions. Students are identifying the domain and range of specific intervals of piecewise functions.

Unit 1.3	Using Intercepts of Linear Equations Create tables and graphs	Lesson 6 of 10	Days 2
Lesson Focus			
1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.REI.10	Graph linear functions using x and y intercepts.	Standard 2: Reason Abstractly and Quantitatively	How can you use intercepts to graph the solutions to a linear equation in two variables?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graph Linear Functions Create a table and graph data from a Linear Function	Standard form of an equation Constant of Variation Direct Variation Rate of Change Slope x-intercept y-intercept	Students often are confused about when x is 0 if that means the x-intercept is 0 or if the y-intercept is 0. It may be a good idea to concentrate on identifying them as always the opposite.	Explorations in CORE Math – Algebra Textbook Lesson 4.2

Suggested Learning Practices	
9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers will model finding the x and y intercepts of linear functions. These functions will be in multiple forms. (i.e. standard form or slope intercept form. Teachers will model creating the 0-0-1 table and will graph the linear function. ***Use Standard Form. Graph vertical and horizontal lines.**	Students will find the x and y intercepts of linear functions. Students will find the intercepts for equations in multiple forms.

Unit 2.1 Introduction to Functions (continued from Quarter 1)		
Quarter 2		
Section	**Days**	**Lesson Notes**
4.3	2	Rate of Change and Slope Determine the slope when given a table, a graph, or two points.
4.4	4	The Slope Formula Real world problems involving slope. Stress the importance of slope as a rate of change and its context in real world problems. Be certain to *include* any problems that involve non-linear functions.
4.5	1	Exploring Direct Variation Use technology
4.6	4	Graphing and Writing Linear Functions

Unit: 2.1	Introduction to Functions	Days : 11 (continued from Quarter 1)

Essential Questions
What is the slope of a linear function and how can you use it to graph the function? How does changing the values of m and a affect the graphs of $f(x) = mx$ and $g(x) = a\|x\|$? How do you represents relationships using linear functions?

Content to be Learned	Skills
Calculate slope from two points, a table, and a graph and write the equation. Classify the slopes of lines. Find the slope from a graph to determine the rate of change in a real-world function. Determining if a relationship is linear or not. Graph absolute value equations. Recognize transformations of linear relations.	Solve equations, identify patterns, and make predictions. Translate algebraic patterns from tables to graphs to equations and back. Perform operations with functions, including determining inverse functions.
Assessments	**Standards**
Formative Assessments Quizzes Chapter Tests Common Tasks	F.BF.1 F.BF.1b F.BF.4a F.IF.2 F.IF.3 F.IF.5 F.IF.6 F.IF.7a and 7b F.IF.9 F.LE.2 A.CED.2 A.REI.10 A.REI.11
Sample Instructional Activities	**Resources**
	Explorations in CORE Math – Algebra Textbook Lessons Springboard Algebra Activities

Unit 2.1	Rate of Change and Slope	Lesson 7 of 10	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12. N.Q. 1 CC. 9-12. A.CED.2 CC. 9-12.F.IF.4 CC. 9-12.F.IF.6 CC 9-12.F.IF.7 CC. 9-12.F.IF.7a	Calculate slope from 2 points, a table or a graph Classify the slopes of lines	Standard 2: Reason abstractly and Quantitatively	What is the slope of a linear function and how you can use it to graph the function?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Continuous linear function	Rate of change, rise, run, slope, constant function	When using the slope formula, given 2 points do not consistently use one of the points as point 1 and the other as point 2 When counting to obtain slope, students put the change in x in the numerator and the change in y in the denominator Counting slopes given a line, students ignore the intervals used on the axes and strictly count the gridlines	Explorations in CORE Math – Algebra 1 Textbook Lesson 4.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling examples of the different ways to obtain slope given a table, linear graph or two points	Students are counting intervals to find the slope given a linear graph Students are using the slope formula given 2 points to find the slope Finding the slope given a table Classifying the slopes of lines

Unit 2.1	The Slope Formula Slope as a Rate of Change in the Context of Real World Problems * Include non-linear functions.	Lesson 8 of 10	Days 4

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12. N.Q. 1 CC. 9-12. A.CED.2 CC. 9-12.F.IF.4 CC. 9-12.F.IF.6 CC 9-12.F.IF.7 CC. 9-12.F.IF.7a	Finding the slope from a graph to determine the rate of change of a real world function Determining if a relationship is linear or not	Standard 2: Reason abstractly and Quantitatively	What is the slope of a linear function and how can you use it to graph a function?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Continuous Linear Functions	Rate of change Rise Run Slope Constant function	Not simplifying equivalent fractions and therefore not recognizing them as constant slopes and therefore linear Students state the labels of the x and y axis as a rate of change and not including any numbers OR Students restate slope ignoring when asked to interpret the slope as a rate of change Students indicate "it went up (or down) " as an explanation of the rate of change	Explorations in CORE Math – Algebra 1 Textbook Lesson 4-4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are concentrating on interpretation of slope as a rate of change in real world situations ***Teachers should be certain to include any problems that involve non-linear functions.**	Students are learning to find the slope and be able to apply the meaning of slope to each individual problem situation

Unit 2.1	Exploring Direct Variation (Use Technology)	Lesson 9 of 10	Days 1

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.2 F.IF.2, 4, 7, 7b F.BF.1, 1a, 3	Students will explore the transformations of $f(x) = mx$ and $g(x) = \lvert x \rvert$.	Standard 5: Use appropriate tools strategically	How does changing the values of *m* and *a* affect the graphs of $f(x) = mx$ and $g(x) = \lvert x \rvert$

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Continuous linear functions Using slope		Students may not recognize how the graph of a function becomes steeper or less steep, depending on the value of m in $f(x) = mx$. Point out that if m is positive and is increased, the graph gets steeper. If m is positive and is decreased, the graph gets less steep. If m is negative, however, the opposite is true because making the value of m "more negative" involves decreasing the value of m. Have students consider the absolute value of slope. As the absolute value increases, the slope gets steeper.	Explorations in CORE Math – Algebra 1 Textbook Lesson 4.5

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Model the use of the graphing calculator. Provide students the opportunity to compare their graphs. Provide students with additional practice, if needed.	Using a graphing calculator to explore how changing m changes the graph of $f(x) = mx$. Graphing the parent absolute value function. Graphing $g(x) = a\lvert x \rvert$ when $\lvert a \rvert > 1$ and when $\lvert a \rvert < 1$. Writing the equation for an absolute value function. Modeling a real-world situation.

Unit 2.1	Graphing and Writing Linear Functions	Lesson 10 of 10	Days 4

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
CC. 9-12.A.CED.2 CC. 9-12.A.REI.11 CC. 9-12.F.IF.4, 6, 7, 7a CC. 9-12.F.BF. 1 CC. 9-12.F.LE. 2	Writing equations in slope intercept form given the following: real world situation 1 point and the slope 2 points or a table	Standard 4: Model with Mathematics	How can you represent relationships using linear functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Continuous linear functions Slope values of m and b in F(x) = mx + b	Slope Y intercept Slope intercept form of linear equation	Attempting to graph the slope instead of using the y intercept Always starting at the origin instead of the y intercept when graphing a line given in slope intercept form Switching x and y when substituting them into slope intercept form to calculate the y intercept Failing to recognize the y intercept that was given to them in a table when attempting to write an equation in slope intercept form	Explorations in CORE Math – Algebra 1 Textbook Lesson 4-6

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will model how to identify the dependent and independent variable from a real world situation, as well as the points that fit the situation Teachers are modeling how to write functions in slope intercept form from each of the following: a linear graph A point on a line and the slope of the line From a table of values (or 2 points) From a real world situation	Graphing equations given in slope intercept form on a coordinate plane Given a graph, locate the y intercept , calculate (or count) the slope in order to write an equation in slope intercept form Identify the independent and dependent variables given a verbal description and determine the coordinates of the points that fit the situation and write the function in slope intercept form From a table of values use two ordered pairs to find the value of m and then use m and an ordered pair to find b; then substitute those values into f(x) = mx +b

Unit 2.2 Applications of Linear Functions

Quarter 2

Section	Days	Lesson Notes
3.5	4	Scatter Plots
4.8	2	Linear Regression *Requires the use of technology.
4.9	4	Slopes of parallel and perpendicular lines Focusing on slopes and real world applications.
4.10	4	Transformations of Linear Functions. *Be certain to graph absolute value transformations.

Unit:2.2	**Applications of Linear Functions**	**Days : 14**

Essential Questions

How can you decide whether a correlation exists between paired numerical data and if so, what is the line of fit for that data?
How can you use residuals and linear regression to fit a line to data?
How can you use linear equations to model the results of a fund-raiser?
How do the values of the constants affect the graphs of: $f(x) = mx + b$ *and* $g(x) = a|x - h| + k$?

Content to be Learned	**Skills**
Students will create scatter plots and determine their correlation. Students will evaluate linear model's goodness of fit by using residuals (using technology). Students will write the equation of the line of goodness of fit for real-world applications. Students will graph linear and absolute value functions and determine the affect of translations.	Graph linear and absolute value equations. Identify trends in data and make predictions. Use technology (graphing calculators).
Assessments	**Standards**
Formative Assessments **Quizzes** **Chapter Tests** **Common Tasks**	F.LE.5 S.ID.6, S.ID.6a, S.ID.6c, S.ID.6, S.ID.7, S.ID.8, S.ID.9 S.IC.6 F.IF.7, F.IF.7a N.Q.1, N.Q.2 A.SSE.1, A.SSE.1a A.CED.2, A.CED.3 F.IF.2,F.IF.4, F.IF.7b F.BF.1, F.BF.3
Sample Instructional Activities	**Resources**
	Explorations in CORE Math – Algebra Textbook Lessons **SpringBoard® "Pass the Book"**

Unit 2.2	Scatter Plots and Trend Lines	Lesson 1 of 4	Days 4

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
F.LE.5 S.ID.6 S.ID.6a S.ID.6c S.ID.7 S.ID.8 S.ID.9 S.IC.6	Students will work with data that are not perfectly linear, and they will fit lines to data only in cases where the data have strong positive or negative correlation. Students will work with real world situations involving scatter plots, analyzing the data presented to determine what is being correlated and whether the correlation is positive or negative.	Standard 3 – Reason abstractly and quantitatively Standard 4 – Model with mathematics	How can you decide whether a correlation exists between paired numerical data and, if so, what is the line of fit for that data? How can you use residuals and linear regression to fit a line to data?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing lines Writing the equation of a line when given two ordered pairs	Correlation Correlation coefficient Interpolation Extrapolation	Students may have difficulty drawing a line of fit on a scatter plot if they are trying to include actual data points on the line. While it is desirable to include points on the line, they should try to balance the number of points above the line with the number of points below the line.	Explorations in Core Mathematics – Algebra Lesson 3.5 Extra graph paper Graphing calculator or other technology (if possible)

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitating/questioning/formatively assessing as the students work through the unit. Provide extra problems for students. Teacher m ay wish to model (with assistance from students) when drawing a line of fit. Give students an opportunity to report out/share their graphs, lines of fit, from a table of values (or 2 points) and equations with their classmates. Demonstrate how to create a scatter plot using technology (if possible).	Working cooperatively or independently through the lesson. Practice with additional problems provided by the teacher. Utilize technology to aid them in creating scatter plots (if available).

Unit 2.2	**Linear Regression** *Requires use of technology	**Lesson 2 of 4**	**Days 2**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
F.LE.5 S.ID.6 S.ID.6a S.ID.6b S.ID.6c S.ID.7 S.ID.8 F.IF.7 F.IF.7a	Students will evaluate a linear model's goodness of fit by using residuals (drawing a residual plot). Students will also compare sums of squared residuals. If technology is available, students will perform linear regression on a graphing calculator or app.	Standard 3 – Reason abstractly and quantitatively Standard 5 – Use appropriate tools strategically	How can you use residuals and linear regression to fit a line to data?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing linear functions Writing linear functions Correlation Fitting lines to data	Residual Residual plot Linear regression	Some students may expect that since the lesson is about linear models, a graph of the residuals should form a straight line. Students often have the wrong sign for their residuals because they subtract the actual value from the predicted value instead of the other way around.	Explorations in Core Mathematics – Algebra Lesson 4.8 Extra graph paper Graphing calculator or other technology (if possible)

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Facilitating/questioning/formatively assessing as the students work through the unit. Give students an opportunity to report out/share their graphs, Model how to perform linear regression on a graphing calculator or app (if possible).	Working cooperatively or independently through the lesson. If available, perform linear regression on a graphing calculator or app. Presenting/reporting out to the class.

Unit 2.2	Slopes of Parallel and Perpendicular Lines	Lesson 3 of 4	Days 4

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
N.Q.1 N.Q.2 A.SSE.1 A.SSE.1a A.CED.2 A.CED.3	In this modeling unit, students will write a linear equation based upon a real world situation. Students will graph their line and use the graph to make predictions.	Standard 5 – Model with mathematics	How can you use linear equations to model the results of a fundraiser?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing a linear equation		Students should be reminded that the scales on the *x*-axis and *y*-axis are not the same for any of the grids provided in the lesson.	Explorations in Core Mathematics – Algebra Lesson 4.9 Graphing calculator or app, if possible.

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitating/questioning/formatively assessing as the students work through the unit. Give students an opportunity to report out/share their graphs, lines of fit, and equations with their classmates. Help students to adjust the window settings on their graphing calculators, if using technology. Provide students with additional real world problems so that they have additional practice.	Working cooperatively or independently through the lesson. Completing additional problems as provided by the teacher. If available, check graphs on a graphing calculator or app. Presenting/reporting out to the class.

Unit 2.2	Transformations of Linear Functions *Be certain to graph absolute value transformation	Lesson 4 of 4	Days 4

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.2 F.IF.2 F.IF.4 F.IF.7 F.IF7b F.BF.1 F.BF.3 F.LE.5	Students will graph linear and absolute-value functions and determine how the values of *m*, *a*, *h*, and *k* affect the translation of the graph.	Standard 7 – Look for and make use of structure	How do the values of the constants affect the graphs of? $f(x) = mx + b$ *and* $g(x) = a\|x - h\| + k$
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Continuous linear functions Using slope Absolute value functions		Remind students that absolute value bars act as grouping symbols. First, perform the operations inside the absolute value bars; then take the absolute value; and then, perform the operations outside the absolute value bars. Students may not recognize whether the graphs are translated right or left, which depends on the sign of *h* in $g(x) = a\|x - h\| + k$. Suggest re-writing it so that it involves subtraction.	Explorations in Core Mathematics – Algebra Lesson 4.10 Graphing calculator or app, if possible.

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitating/questioning/formatively assessing as the students work through the unit. Give students an opportunity to report out/share their graphs. Help students to adjust the window settings on their graphing calculators, if using technology. Give students an opportunity to report out/share their graphs, lines of fit, and equations with their classmates. Have students create a graphic organizer that summarizes the effect s of the constants *a, h,* and *k* on $f(x) = a\|x\|$, as well as a similar organizer for linear functions.	Working cooperatively or independently through the lesson. Completing additional problems as provided by the teacher. If available, check graphs on a graphing calculator or app. Presenting/reporting out to the class. $f(x) = a\|x\|$ constants *a, h,* and *k* on , as well as a similar organizer for linear functions.

Unit 2.3 Systems of Equations and Inequalities

Quarter 2

Section	Days	Lesson Notes
5.1	2	Solving Systems by Graphing.
5.2	2	Solving Systems by Substitution
5.3	3	Solving Systems by Elimination
5.4	3	Solving Special Systems (No Solution, Infinitely Many Solutions) *Include real world applications.

Unit:2.3	**System of Equations and Inequalities**	**Days :10**

Essential Questions	
How do you approximate the solution of a system of linear equations by graphing? How do you use substitution to solve a system of equations? How do you solve a system of linear equations by adding or subtracting? How do you solve systems with no or infinitely many solutions? How do you graph a linear inequality in two variables? How can you use systems of linear equations or inequalities to model and solve contextual problems?	
Content to be Learned	**Skills**
Students will learn how to solve systems of linear equations graphically and algebraically. They will apply their knowledge to real world situations in which they will write and solve systems of equations.	Graphing linear equations and inequalities Solving multistep algebraic equations Solving equations for a given variable Adding and subtracting expressions
Assessments	**Standards**
Quizzes Summative Unit Assessment	A.REI.6 A.REI.5 A.REI.12 N.Q.2 A.CED.3
Sample Instructional Activities	**Resources**
Chapter 5 Systems of Equations and Inequalities	“Explorations in Core Math for Common Core”

Unit 2.3	Solving Systems by Graphing	Lesson 1 of 6	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.6	Approximating the solution of a system of linear equations by graphing.	Standard 5 – Use appropriate tools strategically.	How do you approximate the solution of a system of linear equations by graphing?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing linear equations	• System of linear equations • Solution of a system of linear equations		Explorations in Core Mathematics – Algebra Lesson 5.1

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. Provide extra examples, if necessary. Encourage students to adjust the scale of their graph so that they may estimate a more accurate solution. Give students the opportunity to report out to the rest of the class.	Independently or in groups, the students are graphing systems of linear equations and estimating their solutions.

Unit 2.3	Solving Systems by Substitution	Lesson 2 of 6	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.6	To solve a system of linear equations, students will solve for one of the variables and substitute the resulting expression in the other equation.	Standard 1 – Make sense of problems and persevere in solving them.	How do you use substitution to solve a system of equations?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solve an equation for a given variable	Substitution method	Students may think that they must always solve for *y* because so often equations of lines are written in slope-intercept form. Students may be confused when they get solutions that are fractions.	Explorations in Core Mathematics – Algebra Lesson 5.2

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. Provide additional examples and ask students whether it would be more efficient to solve for *x* or *y*. Give students the opportunity to report out to the rest of the class.	Independently or in groups, the students are working through the activity and then practicing solving systems by substitution.

Unit 2.3	Solving Systems by Elimination	Lesson 3 of 6	Days: 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.5 A.REI.6	Students will identify systems of linear equations that contain like terms with coefficients that are opposites or the same and combine those like terms to eliminate one of both variables, thereby solving systems by elimination.	Standard 3 – Construct viable arguments and critique the reasoning of others. Standard 8 – Look for and express regularity in repeated reasoning.	How do you solve a system of linear equations by adding or subtracting?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Add and subtract expressions	Elimination method	Some students have difficulty determining when they should add and when they should subtract the equations. Some students have difficulty subtracting negative coefficients.	Explorations in Core Mathematics – Algebra Lesson 5.3

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. If possible, using technology, reinforce that they arrived at the correct solution by graphing the linear equations. Give students the opportunity to report out to the rest of the class.	Working through the activity, independently or in groups. If technology is available, they may verify that the solutions they arrived at algebraically are correct by graphing the equations.

Unit 2.3	Solving Special Systems	Lesson 4 of 6	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.6	Students will examine systems that have no solution or infinitely many solutions. They will see that a system with no solution has two parallel lines for its graph, while a system with infinitely many solutions has overlapping lines as its graph.	Standard 5 – Use appropriate tools strategically Standard 6 – Attend to precision	How do you solve systems with no or infinitely many solutions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing linear equations Solving systems graphically Solving systems algebraically	No Solution Infinitely Many	When solving systems algebraically, students get confused as to which scenario means no solution and which means infinitely many solutions.	Explorations in Core Mathematics – Algebra Lesson 5.4

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. If possible, using technology, reinforce that they arrived at the correct solution by graphing the linear equations. Give students the opportunity to report out to the rest of the class.	Working through the activity, independently or in groups. If technology is available, students can look at the graphs of the systems of equations that they solved algebraically.

Unit 3.1 Systems of Equations and Inequalities (continued from Quarter 2)		
Quarter 3		
Section	**Days**	**Lesson Notes**
5.5	2	Solving Linear Inequalities
5.6	3	Solving Systems of Linear Inequalities

Unit: 3.1	**Systems of Equations and Inequalities (continued)**	**Days: 5 (continued from Quarter 2)**

Essential Questions	
How do you graph a linear inequality in two variables? **How can you use systems of linear equations or inequalities to model and solve contextual problems?**	
Content to be Learned	**Skills**
Students will learn how to solve systems of linear inequalities graphically. They will apply their knowledge to real world situations in which they will write and solve systems of inequalities.	Graphing linear equations and inequalities Solving multistep algebraic equations Solving equations for a given variable Adding and subtracting expressions Shading solution sets
Assessments	**Standards**
Quizzes Summative Unit Assessment	A.REI.6 A.REI.5 A.REI.12 N.Q.2 A.CED.3
Sample Instructional Activities	**Resources**
Chapter 5 Systems of Equations and Inequalities	“Explorations in Core Math for Common Core”

Unit 3.1	Solving Linear Inequalities	Lesson 5 of 6	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.REI.12	Graphing a linear inequality and determine its solution set.	Standard 7: Look for and make use of structure.	How do you graph a linear inequality in two variables?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing linear equations in two variables	Linear inequality in two variables Solution of an inequality in two variables	Students may have difficulty remembering when to use a solid or dashed line when graphing the boundary line. Students often choose the wrong half-plane to shade. Caution them to choose (0, 0) as a test point only if (0, 0) is not on the boundary line.	Explorations in Core Mathematics – Algebra Lesson 5.5

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. If possible, graph the inequalities using technology. Give students the opportunity to report out to the rest of the class.	Graphing a linear inequality. Graphing a linear inequality in two variables.

Unit 3.1	Solving Systems of Linear Inequalities	Lesson 6 of 6	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
N.Q 1, 2 A.CED.2	In this Focus on Modeling section, students write and solve a system of linear equations that models purchasing jeans and T-Shirts. Students explore ways to represent relationships between quantities of items purchased and purchase costs.	Standard 4: Model with mathematics	How can you use systems of linear equations and inequalities to model and solve contextual problems?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
• Solving linear systems by substitution • Solving linear inequalities		When substituting an expression containing two terms for a variable that has a coefficient, students often multiply only the first term of the expression by the coefficient, forgetting to multiply the second term as well.	Explorations in Core Mathematics – Algebra Lesson 5.6

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Facilitate/question/formatively assess as students work through the activity. If possible, use technology to graph the system. Give students the opportunity to report out to the rest of the class.	Write a system of linear equations to model a situation. Solve the system algebraically. Check the solution by graphing. Interpret the solution.

Unit 3.2 Exponents and Polynomials

Quarter 3

Section	Days	Lesson Notes
6.1	3	Integer Exponents Operations with exponents including negative exponents
6.2	3	Rational Exponents Include review of simplifying radicals Relate rational exponents and radicals
6.3	2	Polynomials
6.4	2	Adding and Subtracting Polynomials
6.5	3	Multiplying Polynomials

Unit: 3.2	**Exponents and Polynomials**	**Days: 13**

Essential Questions	
How can you develop and use the properties of integer exponents? **What are rational and irrational numbers and how are radicals related to rational exponents?** **What parts of a polynomial represent terms, factors, and coefficients?** **How do you add and subtract polynomials?** **How do you multiply polynomials?**	
Content to be Learned	**Skills**
Students will learn the relationship between rational exponents and radicals. They will apply rules of exponents for integers to rational exponents in order to simplify expressions. They will also perform operations with polynomials.	
Assessments	**Standards**
Quizzes Summative Unit Assessment	N.RN.1, 2, 3 A.SSE.1, 1a, 1b, 2 A.APR.1 F.BF.1a
Sample Instructional Activities	**Resources**
Chapter 6 Exponents and Polynomials	"Explorations in Core Math for Common Core"

Unit 3.2	**Integer Exponents** * Include Operations with negative exponents	**Lesson 1 of 5**	**Days 3**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
N.RN.1	Use the properties of integer exponents as a shorthand method of evaluating exponents and simplifying expressions using the order of operations.	Standard 7 - Look for and make use of structure.	How can you develop and use properties of integer exponents?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Operations with Integers Solving Equations	Exponent Power Base	Students frequently have mistaken exponents to mean multiplication of the base. $2^3 \neq 6$ Students often believe that negative exponents result in the answer becoming negative.	Explorations in Core Mathematics – Algebra Lesson 6.1

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers are modeling properties of exponents by simplifying and/or evaluating expressions with exponents.	Students simplify and/or evaluate expressions with exponents.

Unit 3.2	**Rational Exponents** *Include review of simplifying radicals *Relate rational exponents and radicals	**Lesson 2 of 5**	**Days 2**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
N.RN.1 N.RN.2 N.RN.3	Rational numbers are written as $\frac{p}{q}$. An irrational number cannot be written as the ratio of two integers. The set of rationals is **closed** under all four arithmetic operations, while irrationals is closed under none of them. *Rational exponents and radicals are related by the formula $\sqrt[n]{a} = a^{\frac{1}{n}}$ *and* $\sqrt[n]{a^m} = a^{\frac{m}{n}}$	Standard 3 – Construct viable arguments and critique the reasoning of others	What are rational and irrational numbers and how are radicals related to rational exponents?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Properties of Exponents Operations with Integers Solving Equations	Exponent Power Base Rational Numbers Irrational Numbers Closure Property	Students frequently have mistaken exponents to mean multiplication of the base. $x^{\frac{2}{3}} \neq \frac{2}{3} * x$ Student need to be reminded that: $\sqrt{x} = \sqrt[2]{x^1}$	Explorations in Core Mathematics – Algebra Lesson 6.2

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Teachers are modeling equivalent rational exponent expressions into radical expressions.	Students are simplifying rational exponent expressions and determining their equivalent radical form.

Unit 3.2	Polynomials	Lesson 3 of 5	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.1 A.SSE.1a A.SSE.1.b	Polynomials contain constant and variable terms. For variable terms, the coefficient is the number multiplied by the variable part. They can be written in Standard Form.	Standard 7 – Look for and make use of structure.	What parts of a polynomial represent terms, factors, and coefficients?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Properties of Exponents Operations with Integers	Expression verses Equation Poly-, Tri-, Bi-, Mono- nomials Terms Coefficients /Leading Coefficients Exponents Variables and Constants Operators Degree Polynomial s in Standard Form	Students often believe that the degree of the entire polynomial is the sum of all the terms exponents when the degree of the polynomial is the degree of the term with the greatest degree.	Explorations in Core Mathematics – Algebra Lesson 6.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the identification of the parts of an expression. Teachers assisting students to identify terms. Teachers are modeling transforming polynomial expressions into polynomials in standard form.	Students are identifying the parts of polynomials. Students are writing polynomial expressions in standard form.

Unit 3.2	Adding and Subtracting Polynomials	Lesson 4 of 5	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.APR.1 F.BF.1a	Simplifying polynomials vertically, aligning like terms, and adding their coefficients. You can also add them horizontally, grouping like terms and adding their coefficients. Subtract polynomials adding the opposite of the polynomial being subtracted using either of the methods above.	Standard 4 – Model with Mathematics	How do you add and subtract polynomials?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Operations with exponents Operations with integers	Terms Coefficients Constants Exponents Variables Operators Degree Like Terms	Students mistakenly combine terms which are not like terms ie. $3x^2 + 5x^3 \neq 8x^5$ Students mistakenly forget to distribute the subtraction to all the terms in the polynomial being subtracted. ie. $(2x^3 + 2) - (5x^3 + 6) \neq -3x^3 + 8$	Explorations in Core Mathematics – Algebra Lesson 6.4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling simplifying polynomial expressions using addition and subtraction.	Students are simplifying polynomial expressions using addition and subtraction.

Unit 3.2	Multiplying Polynomials	Lesson 5 of 5	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.2 A.APR.1	Multiplying and simplifying polynomials using the distributive property. ***Note: FOIL only addresses multiplication of Binomials and this lesson requires mastery of multiplications of polynomials greater than two terms.**	Standard 4 – Model with Mathematics Standard 2 – Reasoning Abstractly and quantitatively	How do you multiply polynomials?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Operations with exponents Operations with integers	Terms Coefficients Constants and Variables Exponents Operators Degree Like Terms	Students often forget to multiply the middle terms of the polynomials. Special attention should be afforded to $(x-4)^2 \neq x^2+16$	Explorations in Core Mathematics – Algebra Lesson 6.5

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling simplifying polynomial expressions using multiplication.	Students are simplifying polynomial expressions using multiplication.

Unit 3.3 Factoring Polynomials

Quarter 3

Section	Days	Lesson Notes
7.1	2	Factors and Greatest Common Factor
7.2	3	Factoring by GCF Be sure to include factoring by grouping
7.3 – 7.4	4	Factoring Trinomials : Emphasis on 7.4 where a not = 1

Unit:3.3	Title: Factoring Polynomials	Days : 9

Essential Questions	
How can you find the GCF of monomials? How can you factor x^2+bx+c? How can you factor ax^2+bx+c?	
Content to be Learned	**Skills**
Students will learn to factor expressions. They will be able to recognize when terms of an expression share common factors and they will be able to recognize when an expression fits a certain pattern based on the structure of its parts.	Identifying the components of an expression. Perform prime factorization in order to determine greatest common factor. Find factors of monomials. Writing multiple representations for poly and trinomial expressions. Multiplying polynomials.
Assessments	**Standards**
Formative Assessments Quizzes Chapter Tests Common Tasks	A.SSE.1a A.SSE.1b A.SSE.2
Sample Instructional Activities	**Resources**
Chapter 7 Factoring Polynomials	"Explorations in Core Math For Common Core" Algebra Textbook Lessons

Unit 3.3	Title: Factors and Greatest Common Factor	Lesson 1 of 3	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.1a A.SSE.1b	Find the Greatest Common Factor (GCF) of Two Monomials	Standard 7 Look for and make use of structure.	How can you find the GCF of monomials?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Identify components of expressions. Prime Factorization.	Binomial Expression Factor Factoring Greatest Common Factor Monomial	Students identify a factor but fail to determine if it is the greatest common factor.	Explorations in Core Mathematics – Algebra Lesson 7.1

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are ensuring students mastery of finding the GCF by beginning with reviewing Prime Factorization graduating to finding the GCF of two monomials with more than one variable.	Students are demonstrating their ability to perform prime factorization to find the GCF. This will include being able to find the GCF of two monomials with more than one variable by multiplying the GCF of the coefficients times all common variables to their lowest power.

Unit 3.3	Title: Factoring by GCF *Be sure to include factoring by grouping	Lesson 2 of 3	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.1, 1b, 2	Factoring by grouping	Standard 1. Make sense of problems and persevere in solving them. Standard 8. Look for and express regularity in repeated reasoning.	How can you factor polynomials completely by grouping?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Multiply Binomials. Identifying the components of an expression. Find factors of monomials. Perform prime factorization in order to determine greatest common factor.	Expression FOIL Factors Factoring Poly, Tri, Binomials Binomial Factors		Explorations in Core Mathematics – Algebra Lesson 7.2

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Review how to use the GCF to factor an expression with a common binomial factor, such as $3(x+1)-2x(x+1)$. Remind students that a binomial can be factored out of a term just as a monomial can. Tell students that they can factor some polynomials with four terms by grouping the terms in pairs and factoring out common monomials and binomials.	Factoring out a GCF by grouping. Factoring with binomial opposites [i.e. $(3-x)$ and $-(3-x)$].

Unit 3.3	**Title: Factoring Trinomials** Including Factoring ax^2+bx+c with emphasis on where 'a' is not equal to 1	**Lesson 3 of 3**	**Days 4**

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.2	Factoring Trinomials	Standard 7. Look for and make use of structure.	How can you factor ax^2+bx+c?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Multiply Binomials. Identifying the components of an expression. Find factors of monomials. Perform prime factorization in order to determine greatest common factor.	Expression FOIL Factors Factoring Poly, Tri, Binomials Binomial Factors Quadratic Form - **ax^2+bx+c**	Students may miss identifying the complete list of possible factors by disregarding negative number factor combinations.	Explorations in Core Mathematics – Algebra Lesson 7.3 and 7.4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the steps used to factor trinomials where the coefficient of the 'a' term is not equal to 1. The use of a graphic organizer will assist students in understanding the process of factoring **ax^2+bx+c** into the product of two binomials.	Students are identifying the a, b and c of given trinomials. They are finding the factor pairs for 'a'. They are finding the factor pairs for 'c' Using these lists of factors, students are finding the sum of the product of one set of factor pairs for a and c. They are determining if the that sum equals b, and then writing the factored form of **ax^2+bx+c** as a product of two binomials.

Unit 3.4 Quadratic Functions and Equations

Quarter 3

Section	Days	Lesson Notes
8.1	2	Introduction to Quadratic Function Graphs (effect of a)
8.2	3	Characteristics of Quadratic Functions Vertex form focusing on effects of h & k, as well as Domain and Range Exposure to writing (as an introduction, not for mastery)
8.4	3	Transforming Quadratic Functions Graphing in vertex form and comparing each to the parent function

Unit:3.4	Quadratic Functions and Equations	Days : 8

Essential Questions

What is the effect of the constant a on the graph of g(x) = ax^2?

What is the effect of the constants h and k on the graph of g(x) = a$(x-h)^2 + k$?

How can you obtain the graph of g(x) = a$(x-h)^2 + k$

Content to be Learned	Skills
Students will learn graph quadratic functions and show intercepts and maxima and minima. They will be able to identify the effect of adding or multiplying by a constant on the graph of a quadratic function. Students will learn how to graph an equation in vertex form	Graphing the parent quadratic function Recognizing the graph of a quadratic function as a parabola and identifying the vertex as the maximum or minimum of the function. Graphing quadratic functions by making a table to determine the effect of a, h and k on the graph of a quadratic function Being able to graph a quadratic function given in vertex form
Assessments	**Standards**
Formative Assessments Quizzes Chapter Tests Common Tasks	F.IF.2, 4, 5, 7, and 7a F.BF.1 & 3 A.CED.2
Sample Instructional Activities	**Resources**
Chapter 8 Quadratic Functions and Equations	"Explorations in Core Math For Common Core" Algebra Textbook Lessons 8-1, 8-2 and 8-4

Unit 3.4	**Introduction to Quadratic Function Graphs** (effect of 'a')	**Lesson 1 of 3**	**Days 2**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.2 F.IF.2, 4, 5, 7, 7a F.BF.1, 3	The quadratic function $f(x) = x^2$ is the parent function of $f(x) = ax^2 + bx + c$, where $a \neq 0$. $f(x) = x^2$ is an even function and therefore has symmetry in the y-axis. Its graph is a u-shaped curve called a parabola and the turning point of the parabola is called the vertex. The vertex of $f(x) = x^2$ is (0, 0). If a>1, the parabola is stretched vertically. If $0 < a < 1$ the parabola is shrunk vertically. The new graphs are still symmetric in the y-axis and each has vertex (0, 0). If the value of a is negative, then the parabola is reflected over the x-axis and opens downward.	Standard 7: Look for and make use of structure.	What is the effect of the constant *a* on the graph of $g(x) = ax^2$?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Functions	Quadratic function Parabola Vertex	Students may perceive the horizontal changes in a graph more readily than the vertical changes, so they may describe a vertical stretch as a horizontal shrink. Explain to students that changes are described in the vertical because they describe changes in the y-value for a given x-value.	8.1 in "Explorations in Core Math for Common Core"

Suggested Learning Practices	
9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Facilitate/question/formatively assess as students work through the activity. If possible, use technology to graph the parabolas. Give students the opportunity to report out to the rest of the class.	Analyzing the parent quadratic function. Graphing $g(x) = ax^2$ when $a > 0$. Graphing $g(x) = ax^2$ when $a < 0$. Writing the equation for a quadratic function.

Unit 3.4	**Characteristics of Quadratic Functions** Vertex form focusing on effects of h & k, as well as Domain and Range *(Exposure to writing – not for mastery)*	**Lesson 2 of 3**	**Days 2**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.2 F.IF.2, 4, 5, 7a F.BF.1, 3	Students will graph quadratic functions in the form $f(x) = (x-h)^2 + k$ and make the connection between the equation of the function and the vertex (h, k) of its graph.	Standard 7: Look for and make use of structure	What are the effects of the constants h and k on the graph of $g(x) = (x-h)^2 + k$?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Functions Quadratic Functions			Explorations in Core Mathematics – Algebra Lesson 8.2

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Model graphing. Facilitate/question/formatively assess as students work through the activity. If possible, use technology to graph the parabolas. Give students the opportunity to report out to the rest of the class.	Graphing functions of the form $g(x) = x^2 + k$. Graphing functions of the form $g(x) = (x-h)^2$. Writing equations for quadratic functions.

Unit 3.4	**Transforming Quadratic Functions** Graphing in vertex form and comparing each to the parent function	**Lesson 3 of 3**	**Days 3**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.4 F.IF.2, 4, 7, 7a F.BF.3	Students will graph the parent function then stretch or shrink the graph vertically by a factor of a, and then reflect in the x-axis if a<0. Then, students will translate the graph horizontally h units and vertically k units.	Standard 4: Model with mathematics	How can you obtain the graph of $g(x) = a(x-h)^2 + k$ from the graph of $f(x) = x^2$?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing quadratic functions			Explorations in Core Mathematics – Algebra Lesson 8.4

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Facilitate/question/formatively assess as students work through the activity. If possible, use technology to graph the parabolas. Give students the opportunity to report out to the rest of the class.	Graphing $g(x) = a(x-h)^2 + k$. Writing a quadratic function from a graph.

Unit 4.1 Quadratic Functions and Equations (continued from Quarter 3)

Quarter 4

Section	Days	Lesson Notes
8.3	3	Graphing Quadratic Functions in Standard Form Factor and Solve to find x intercepts, solve for axis of symmetry, vertex and y intercept in order to graph
8.6	3	Solving Quadratic Equations by Factoring
8.5	4	Solving Quadratic Equations by Graphing Be sure to include all real life applications
8.7	3	Solving Quadratic Equations Using Square Roots
8.8	3	Completing the Square
8.9	3	The Quadratic Formula and the Discriminant Stress the importance of the discriminant.
8.10	2	Nonlinear Systems: Solve a system of equations when one equation is linear and the other is quadratic

Unit:4.1	Quadratic Functions and Equations (continued from Quarter 3)	Days : 21

Essential Questions

How can you describe key attributes of the graph of f(x) = a$x^2 + bx + c$ by analyzing its equation?
How can you solve a quadratic equation by graphing, by factoring, and by using square roots?
How can you solve quadratic equations by not factoring?
How can you derive the quadratic formula and use it to solve quadratic equations?
How can you solve a system of equations when one is linear and the other is quadratic?

Content to be Learned	Skills
Students will graph quadratic functions in standard form using key attributes (vertex, maximum, or minimum, symmetry and intercepts) to draw the graph. Given a quadratic equation c= a$(x-h)^2 + k$, students will separate the equations and graph the quadratic function and the linear function and fine the point(s) of intersection There can be no, one or two solutions. Students will factor and solve quadratic equations to find the zeros of the function. Students will solve quadratic functions by isolating the perfect square, and taking the square root of both sides resulting in two solutions (Pos. and neg. square root) Students will solve quadratic equations by completing the square Students will use the discriminant to determine the number of real solutions to a given quadratic equation. Students will use the quadratic formula to find the solutions of a quadratic equation Solving a systems of equations when one equation is linear and the other is quadratic by graphing to find the point(s) of intersection	Students will factor and solve quadratic trinomials to find the x intercepts, and solve for the x of axis of symmetry and use that value to find vertex. Recognizing and using the y intercept and symmetry as well as the previously solved for points will allow graphing. Students will separate functions given in vertex form = c in to a quadratic and a linear equation, graph both and look for point(s) of intersection Given a quadratic function, students will rearrange the equation into standard form, then factor and solve it to find the zeros using the zero product property. Students will learn to identify the zeros as x intercepts Students will learn to isolate perfect square and take the square root of both sides(pos. and neg. sq.root) to solve for the variable Students will recognize the pattern of a binomial squared (determining that c = $\text{the square of } (b)/(2))$, so they can work backwards to complete the square and then apply the definition of a square root Students will learn to find the discriminant and use it to determine the number of solutions given a quadratic equation. Using the quadratic formula , students will find the solutions of quadratic equations Graphing to solve a system equations with 1 linear and 1 quadratic equation by graphing both equations on the same coordinate plane to find the intersection point(s)

Assessments		Standards	
Formative Assessments	Quizzes	F.I.F. 4, 7,7a, 8 and 8a	A.CED.1 & 2
Chapter Tests	Common Tasks	A.REI.4, 4a, 4b, 7, and 11	A.SSE 3 & 3a

Sample Instructional Activities	Resources
Chapter 8 Factoring Polynomials	"Explorations in Core Math For Common Core" Algebra Textbook Lessons 8-3, 8-5 thru 8-10

Unit 4.1	Graphing Quadratic Functions	Lesson 1 of 7	Days 3

Lesson Focus

1.Standards Addressed	2. Content to be Learned	3.Mathematical Practices	4. Essential Questions
F.IF.7 F.IF.7a F.IF.8a	Students will be able to graph in standard form and describe key attributes of the graph (vertex, maximum, minimum axis of symmetry and intercepts)	Standard 7:Look for and make use of structure	How can you describe key attributes of the graph of f(x) = a$x^2 + bx + c$ by analyzing its equation?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Transformations of the graph of f(x)=ax^2 Factoring = a$x^2 + bx + c$	zero-product property maximum, minimum axis of symmetry zeros = x intercepts	failing to make the connection between solving by factoring to find zeros and those solutions being the x intercepts failing to use information they already know to check that the parabola is correct (ex. Direction of opening of parabola)	Explorations in Core Mathematics – Algebra Lesson 8.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
CONSIDER using section 8-6 as a review of solving quadratic equations by factoring and using zero product property to solve before beginning this section, based on your class familiarity with factoring to solve. Teachers are reviewing standard form of a quadratic equation, as well as factoring and solving using zero-product property to determine the x intercepts of the quadratic equation Once x intercepts are graphed, they are demonstrating the use of symmetry to determine and draw the axis of symmetry halfway between the x intercepts Using symmetry, teachers are demonstrating that the vertex must lie on the axis of symmetry and therefore substituting the x value from the axis of symmetry will result in the y coordinate of the vertex Teachers are reminding students that f(0) results in the y intercept which is c and symmetry can be used to get an additional point once the y intercept is graphed Note: finding the axis of symmetry using the formula $-\frac{b}{2a}$ may be used as a check to be sure that zeros and axis of symmetry are correctly graphed before continuing	Solving quadratic equations in standard form by factoring to find the x intercepts Graphing those x intercepts on the x axis locating the x value halfway between the 2 x intercepts to determine and draw the axis of symmetry and using that x value to find and graph the vertex. Finding the y intercept (c) because it is f(0), graphing it and using symmetry to graph an additional point Drawing the parabola

Unit 4.1	Solving Quadratic Equations by Factoring	Lesson 2 of 7	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.SSE.3, 3a A.CED.1 A.REI.4, 4b F.IF.8	Solving Quadratic Equations by factoring	Standard 1: Make sense of problems and persevere in solving them	How can you solve quadratic equations by factoring?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Multiplying binomials Factoring Trinomials	zeros zero product property	Forgetting to rewrite quadratic equations in standard form before factoring them Forgetting the underlying assumption of the zero product property (product of the factors must equal zero)	Explorations in Core Mathematics – Algebra Lesson 8.6

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are making a connection between factoring and the zeros of a quadratic function	Students are solving quadratic functions by factoring and solving using zero product property. Since the zeros are found by setting f(x)=0 , the zeros are the x intercepts

Unit 4.1	**Solving Quadratic Equations by Graphing** Be sure to include all real world applications	**Lesson 3 of 7**	**Days 4**

Lesson Focus

1. Standards Addressed	**2. Content to be Learned**	**3. Mathematical Practices**	**4. Essential Questions**
A.CED.1 A.CED.2 A.REI.11	Solving a quadratic equation by graphing by writing the equation as two functions: a quadratic function and a linear function. When graphing both the parabola and the line, the x-values of the intersection point(s) are the solutions to the problem. There can be no solution, one solution or two solutions	Standard 4: Model with Mathematics	How can you solve a quadratic equation by graphing?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Graphing quadratic functions Graphing systems and recognizing point(s) of intersection as solutions	x-intercepts	Students may incorrectly give the y-value of the points of intersection as the solution Students may fail to realize that negative solutions may need to be eliminated based on the context of the problem	Explorations in Core Mathematics – Algebra Lesson 8.5

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	**10. Learning Practices (What are the students doing)**
Be sure to include all Real World applications Teachers are modeling the solution of a quadratic equation by writing the equation as two functions: a quadratic and a linear function and graphing both on a coordinate plane and demonstrating that the x-values of the point(s) of intersection are the solutions to the problem	Students are separation a quadratic equation into two functions: a linear and a quadratic function. Students are then graphing both equations on a coordinate plane and noting that the point(s) of intersection are the solutions to the equation.

Unit 4.1	Solving Quadratic Equations Using Square Roots	Lesson 4 of 7	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.1 A.REI.4 A.REI.4b	Solving a quadratic equation in the form $a([x-h)]^2+k=c$ using square roots.	Standard 2: Reason abstractly and quantitatively	How can you solve a quadratic equation using square roots

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Simplifying square roots	square root	Neglecting to consider the negative square root Lack of understanding that squaring and taking the square root are inverse operations and therefore undo each other	Explorations in Core Mathematics – Algebra Lesson 8.7

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the solution of a quadratic equation using square roots by isolating the perfect square $([x-h)]^2$ on one side of the equation, applying the definition of square root yielding the positive and negative square root then solving for x	Students are finding solution of a quadratic equation using square roots by isolating the perfect square $([x-h)]^2$ on one side of the equation, by first subtracting k from both sides, then dividing both sides by a. Next students will apply the definition of square root yielding the positive and negative square root then solving for x by adding h to both the positive and the negative square root

Unit 4.1	Completing the Square	Lesson 5 of 7	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.1 A.REI.4, 4a, 4b	Solving Quadratic Equations by Completing the Square, wh	Standard 6: Attend to precision	How can you solve quadratic equations without factoring?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving $ax^2 + bx + c = 0$ by factoring Patterns of binomials squared	perfect square trinomial completing the square	Squaring a binomials results in a binomial with the a term squared and the c term squared. Whatever you *add* to create the perfect square trinomial must also be *added* to the other side of the equation to keep it balanced Attempting to apply the square root property to a nonnegative number	Explorations in Core Mathematics – Algebra Lesson 8.8 Note: graphic organizer on page 467

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are beginning this lesson with a warm up exercise to review/familiarize students with the patterns of binomials squared Teachers are modeling the steps of completing the square: Note: students will increase their chances of success with the multi-step process of completing the square if they leave room for the $\left(\left[\frac{b}{2a}\right]\right)^2$ on both sides of the equation and put in the plus signs as a reminder.	Students are beginning by squaring binomials to recognize the pattern that $a(x+a)^2 = x^2 + 2ax + a^2$ and $(x-a)^2 = x^2 - 2ax + a^2$ Students are completing the square using the following steps: Move the constant to one side of the equation Add a constant to both sides of the equation that will create a perfect square trinomial (the constant = $\left(\left[\frac{b}{2a}\right]\right)^2$) Write the trinomial as the square of a binomial, the definition of square root may be applied (provided the constant is non-negative) Result: binomial is equal to plus or minus the square root of the constant Finish by solving each for x

Unit 4.1	The Quadratic Formula and the Discriminant Stress the importance of the discriminant	Lesson 6 of 7	Days 3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.1 A.REI.4 A.REI.4a	Using the discriminant to determine the number or real solutions to a quadratic equation Using the Quadrtic Formula to solve quadratic equations	Standard 2: Reason abstractly and quantitatively Standard 6: Attend to precision	How can you use the quadratic formula to solve quadratic equations?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Rearranging Quadratic equations into standard form Square root Solving standard form of a quadratic equation by factoring Completing the Square	quadratic formula discriminant	Failing to rearrange quadratic equation into standard form and therefore incorrectly identifying a,b, and c	Explorations in Core Mathematics – Algebra Lesson 8.9

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling the use of the discriminant to determine the number of real solutions to a quadratic equation Teachers are modeling the steps to successfully solve quadratic equations using the quadratic formula	Students are rearranging quadratic equations into standard form, and identifying a, b, and c Students are using the discriminant and their knowledge of square root to determine the number of real solutions given a quadratic equation Students are substituting the values of the coefficients and constant correctly into the quadratic formula and simplifying to obtain the solutions.

Unit 4.1	**Nonlinear Systems:** Solve a system of equations when one equation is linear and the other is quadratic	Lesson 7 of 7	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
A.CED.2 A.REI.4, 4b, and 7 F.IF. 4	Solving systems of equations where one is quadratic and one is linear, by two methods: graphing and substitutions	Standard 5: Use tools appropriately	How can you solve a system of equations when one equation is linear and the other is quadratic?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Solving linear systems Graphing f(x) = a$x^2 + bx + c$		Failing to extend the graphs enough to locate the point(s) or intersection	Explorations in Core Mathematics – Algebra Lesson 8.10

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are reviewing the solution possibilities for solving a linear system. Teachers are modeling the possibilities of intersection between a parabola and a line Teachers are modeling graphing a quadratic equation and a linear equation on the same coordinate plane to determine the solution to the system, and them verifying the solution using substitution	Given a system of equations where one equation is linear and one is quadratic, students are graphing both on the same coordinate plane to locate the point(s) of intersection as a method of solving the system of equations. Students are the solving the solution algebraically by solving both equations for y and setting them equal to each other to find x and substituting the x-value back in to find y as a method of verifying the solution they obtained by graphing

Unit 4.2 Exponential Functions

Quarter 4

Section	Days	Lesson Notes
9-2	2	Exponential Functions
9-3	2	Exponential Growth and Decay Be sure to include real life applications: appreciation, depreciation and compound interest

Unit: 4.2	Exponential Functions	Days : 4

Essential Questions
How does changing the values of a, h and k affect the graph of an exponential function? How do you write, graph, and interpret exponential growth and decay functions?

Content to be Learned	Skills
Graphing functions and parent exponential functions. Graphing transformations of parent exponential functions. Graph exponential functions showing intercepts and end behavior Recognize situations in which a quantity grows or decays by a constant rate per unit interval relative to another. Construct exponential functions given a graph, description or table. Interpret the parameters in a exponential function in terms of context.	Use technology to graph exponential relationships and their transformations. Interpret graphs of exponential functions.
Assessments	**Standards**
Formative Assessments Quizzes Chapter Tests Common Tasks	F.BF.3 F.LE.1c F.LE.2 F.IF.7e
Sample Instructional Activities	**Resources**
	Explorations in CORE Math – Algebra Textbook Lessons Springboard Algebra Activities

Unit 4.2	Exponential Functions	Lesson 1 of 2	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
F.BF.3 F.LE.2	Graph exponential functions and their transformations.	Standard 3 – Reason abstractly and quantitatively Standard 4 – Model with mathematics	How does changing the values of a, h and k affect the graph of an exponential function?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Teaching Materials
Use of a graphing calculator or graphing calculator app. Graphing functions	Functions Exponential Growth and Decay Bounds Translations	Students may interpret the positive trend of an exponential relationship as linear.	Explorations in CORE Math – Algebra Textbook Lesson 9.2

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling operations with exponential functions. Teachers are modeling the differences of linear, quadratic and exponential relationships. Teachers are modeling the effects of a translation on a parent exponential function. ***** Students must continue to practice and master the skill of describing a situation that represents a given graph as well as creating graphs that model given situations as practiced in this section.**	Students are graphing parent exponential functions and their translations. Students are interpreting the graph of exponential relationships in the context of the given problem.

Unit 4.2	Exponential Growth and Decay	Lesson 2 of 2	Days 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Questions
F.IF.7e F.LE.lc F.LE.2	Graph and interpret exponential growth and decay functions	Standard 3 – Reason abstractly and quantitatively Standard 4 – Model with mathematics	How do you write, graph, and interpret exponential growth and decay functions?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Teaching Materials**
Use of a graphing calculator or graphing calculator app. Graphing functions	Functions Exponential Growth and Decay Domain and Range Constant Ratio Bounds End Behavior Discrete data Asymptote	Students will need to be reminded that an exponential function has the form: $f(x) = ab^x$ Where $a \neq 0, b \neq 0$ *and* $b > 0$ *and b has a constant ratio* Students may incorrectly think that as the exponential growth or decay approaches an asymptote that it will eventually cross over it.	Explorations in CORE Math – Algebra Textbook Lesson 9.3

Suggested Learning Practices

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers are modeling graphing both exponential growth and decay. Teachers are modeling the interpretation of exponential graphs in the context of the given problem. ***** Students must continue to practice and master the skill of describing a situation that represents a given graph as well as creating graphs that model given situations as practiced in this section.**	Students are graphing exponential growth and decay. Students are interpreting the graph of exponential relationships in the context of the given problem.