Accelerated Algebra 1 – Unit 4:
Expressions and Equations

Description of the critical area: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions and determine the values of the function it defines. Students understand that polynomials form a system analogous to the integers, they choose and produce equivalent form of an expression.

CLUSTERS	COMMON CORE STATE STANDARDS
Interpret the structure of expressions.	A.SSE.1 Interpret expressions that represent a quantity in terms of its context.★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.* A.SSE.2 Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).*
Write expressions in equivalent forms to solve problems.	A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15t can be rewritten as (1.151/12)12t □□1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
Perform arithmetic operations on polynomials.	A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
Create equations that describe numbers or relationships.	A.CED.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*. A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*
Solve equations and inequalities in one variable.	A.REI.4 Solve quadratic equations in one variable.

	a. Use the method of completing the square to transform any quadratic equation in *x* into an equation of the form *(x – p)2 = q* that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for *x2* = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as *a ± bi* for real numbers *a* and *b*.
Solve systems of equations.	A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line y = –3x and the circle x2 + y2 = 3.*
MATHEMATICAL PRACTICES	LEARNING PROGRESSIONS
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the arguments of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	http://ime.math.arizona.edu/progressions/ Progression to algebra

[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**

[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

★Indicates a modeling standard linking mathematics to everyday life, work, and decision-making.

(+) Indicates additional mathematics to prepare students for advanced courses.

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Represent a quantity in terms of an expression, such as terms, factors, and coefficients by viewing one or more of their parts as a single entity. • Writing in equivalent forms to find solutions that reveal and explain properties of quadratic expressions from completing the square, factoring, and using properties of exponent. • Apply rules that polynomials form a system analogous to integers. • Represent equations and inequalities in one variable in various ways and use them to solve problems. • Understand the relationship between quantities of two or more variables through graphing on a coordinate system.	1. How will students identify the different parts of an expression and explain their meaning within the context of the problem? 2. What is the importance of identifying the structure of an expression and ways to rewrite it? 3. Why is it important to solve and produce equivalent forms of an expressing 4. When is factoring the best method to solve a quadratic expression? 5. When is completing the square useful to reveal the maximum or minimum value of the function it defines? 6. How do you know which method to use in	• Analogous • Complex • Coefficient • Coordinate • Drive • Entity • Equation • Equivalent • Exponentials • Expression • Factors • Function

• The ability to manipulate variables of formulas to solve equations. • Transforming quadratic equations using the method of completing the square to derive a solution. • Recognizing the various methods to solve quadratic equations stemming from an initial form as appropriate: taking the square root, completing the square, quadratic formula, and factoring. • Identify when the quadratic formula gives complex solutions. • The ability to solve systems of linear equations in two variables algebraically and graphically	solving quadratic expression? 7. Why is it important to know the operations of integers to understand the properties of polynomials? 8. How do I analyze algebraic equations/inequalities to solve problems? 9. What must students understand in order to create equations that describe numbers or relationships? 10. How do you know which is the most efficient ways to solve a quadratic equation? 11. Why is it important to understand solving a system of linear and quadratic equations in two variables algebraically and graphically? 12. Who are the methods of solving a quadratic equation related? 13. How do we know when the roots of a quadratic equation are real or complex? 14. Why are the methods of solving quadratic equations not learned in isolation?	• Inequalities • Interpret • Intersection • Linear • Polynomial • Product • Quadratic • Quantity • Term • Transform • Variable

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
http://www.engageny.org/resource/algebra-ii-module-1 Progression on HS Math - http://commoncoretools.me/wp-content/uploads/2012/12/ccss_progression_functions_2012_12_04.pdf Math Resources - http://mid-illini.org/CCSS_Math_Resources.html HS Algebra - http://www.parcconline.org/samples/mathematics/high-school-functions HS Algebra - http://www.illustrativemathematics.org/standards/hs http://www.wiki-teacher.com/ Math Resources – algebra http://www.insidemathematics.org/index.php/tools-for-teachers/course-1-algebra Tools for algebra	• The use of algebraic tiles to establish a visual understanding of algebraic expression and the meaning of terms, factors, and coefficients. • The development and proper use of mathematical language (ie: Frayer Model, Word Wall, using real world context). • Students will create multiple ways to rewrite an expression that represents its equivalent form.	http://www.smarterbalanced.org/ H.S. SBAC Sample Assessment http://dese.mo.gov/divimprove/assess/documents/asmt-sbac-math-hs-sample-items.pdf Missouri HS Math Assessments http://www.parcconline.org/samples/mathematics/high-school-mathematics PARCC HS Assessments

http://map.mathshell.org/materials/tasks.php Algebra lessons http://www.readingrockets.org/strategies/think-pair-share/ Pair share/peer collaboration on different methods to solve a system of equations. http://serc.carleton.edu/introgeo/gallerywalk/how.html Gallery Walk depicting various ways to solve a system of equations. Urge students to use an graphic organizer.		

LANGUAGE GOALS

Students will be able to compare and contrast the various methods of solving a quadratic equation.
Example: To solve this quadratic equation, I use_____ instead of _____ because_____.

Students will be able to explain (writing/speaking) their understanding of the properties of the quantity represented in terms of their context.
Example: x2 + 6x + 9 = _____.

Students will be able to read a word problem and identify the language needed to create an algebraic representation in order to solve the problem.
Example:

Students will explain the use of the _____method to find the solution of the quadratic equation. (writing/speaking)
Example: To solve this quadratic equation, I use_____ because_____.

Students will be able to understand the vocabulary for the parts that make the whole expression/equation and be able to identify their parts and interpret their meaning in terms of a context.
Example: Using the Frayer Model to introduce students to understand the difference between the parts of an expression and that of an equation.

PERFORMANCE TASKS

Formative Assessment Project – MARS Task
Interpreting Algebraic Expressions - A.SSE.1-2: http://map.mathshell.org/materials/download.php?fileid=694
Solving Linear Equations in Two Variables – A.REI.5-7: http://map.mathshell.org/materials/download.php?fileid=669
Sorting Equations and Identities – A.SSE.1-3, A.REI.4: http://map.mathshell.org/materials/download.php?fileid=688

DIFFERENTIATION📖		
FRONT LOADING	ACCELERATION	INTERVENTION
• Students apply their understanding of expressions as sums of terms and products of factors. • Students apply and extend their knowledge of the Number System, students see all numbers as part of a unified system, and become fluent in finding and using the properties of operations to find the values of numerical expressions that include those numbers. • Students apply their knowledge about the order of operations , and properties of operations to transform, simple expressions. Transformations require an understanding of the rules for multiplying negative numbers, and properties of integer exponents. • Students will work with radicals and integer exponents to generate equivalent numerical expressions and equations. Students will extend their knowledge of analyzing and solving linear equations and pairs of simultaneous linear equations. Students will use their prior knowledge of graphing proportional relationships, lines, and linear equations.	• Students will design a word problem that reflects the use of graphing a quadratic equation. • Students will write a scenario and explain the process needed to solve a system of linear and quadratic equations with two variables. • Create a real world problem where factoring is the best method to solve a quadratic expression. • Have students apply their math knowledge of quadratic equations to solve a word problem they have created.	• Use of real context examples to demonstrate the meaning of the parts of algebraic expression, Example: To illusutrate the actual items representing the items symbolically in order to set up an equation. • Use hands-on materials, such as algebra tiles, can be used to establish a visual understanding of algebraic expressions and the meaning of terms, factors and coefficients. • Students find it useful through technology to recognize that two different expressions represent the same relationship. • Provide a situation that uses realia to further demonstrate the meaning of the parts of algebraic expressions to counter student misconceptions.

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