South Carolina College- and Career-Ready (SCCCR) Algebra 2

South Carolina College- and Career-Ready Mathematical Process Standards

The South Carolina College- and Career-Ready (SCCCR) Mathematical Process Standards demonstrate the ways in which students develop conceptual understanding of mathematical content and apply mathematical skills. As a result, the SCCCR Mathematical Process Standards should be integrated within the SCCCR Content Standards for Mathematics for each grade level and course. Since the process standards drive the pedagogical component of teaching and serve as the means by which students should demonstrate understanding of the content standards, the process standards must be incorporated as an integral part of overall student expectations when assessing content understanding.

Students who are college- and career-ready take a productive and confident approach to mathematics. They are able to recognize that mathematics is achievable, sensible, useful, doable, and worthwhile. They also perceive themselves as effective learners and practitioners of mathematics and understand that a consistent effort in learning mathematics is beneficial.

The Program for International Student Assessment defines mathematical literacy as "an individual's capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It assists individuals to recognize the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens" (Organization for Economic Cooperation and Development, 2012).

A mathematically literate student can:

1. **Make sense of problems and persevere in solving them.**
    a. Relate a problem to prior knowledge.
    b. Recognize there may be multiple entry points to a problem and more than one path to a solution.
    c. Analyze what is given, what is not given, what is being asked, and what strategies are needed, and make an initial attempt to solve a problem.
    d. Evaluate the success of an approach to solve a problem and refine it if necessary.

2. **Reason both contextually and abstractly.**
    a. Make sense of quantities and their relationships in mathematical and real-world situations.
    b. Describe a given situation using multiple mathematical representations.
    c. Translate among multiple mathematical representations and compare the meanings each representation conveys about the situation.
    d. Connect the meaning of mathematical operations to the context of a given situation.

3. **Use critical thinking skills to justify mathematical reasoning and critique the reasoning of others.**
    a. Construct and justify a solution to a problem.
    b. Compare and discuss the validity of various reasoning strategies.
    c. Make conjectures and explore their validity.
    d. Reflect on and provide thoughtful responses to the reasoning of others.

4. **Connect mathematical ideas and real-world situations through modeling.**
    a. Identify relevant quantities and develop a model to describe their relationships.
    b. Interpret mathematical models in the context of the situation.
    c. Make assumptions and estimates to simplify complicated situations.
    d. Evaluate the reasonableness of a model and refine if necessary.

5. **Use a variety of mathematical tools effectively and strategically.**
    a. Select and use appropriate tools when solving a mathematical problem.
    b. Use technological tools and other external mathematical resources to explore and deepen understanding of concepts.

6. **Communicate mathematically and approach mathematical situations with precision.**
    a. Express numerical answers with the degree of precision appropriate for the context of a situation.
    b. Represent numbers in an appropriate form according to the context of the situation.
    c. Use appropriate and precise mathematical language.
    d. Use appropriate units, scales, and labels.

7. **Identify and utilize structure and patterns.**
    a. Recognize complex mathematical objects as being composed of more than one simple object.
    b. Recognize mathematical repetition in order to make generalizations.
    c. Look for structures to interpret meaning and develop solution strategies.

South Carolina College- and Career-Ready (SCCCR) Algebra 2

Key Concepts	Standards	
Arithmetic with Polynomials and Rational Expressions	**The student will:**	
	A2.AAPR.1*	Add, subtract, and multiply polynomials and understand that polynomials are closed under these operations.
	A2.AAPR.3	Graph polynomials identifying zeros when suitable factorizations are available and indicating end behavior. Write a polynomial function of least degree corresponding to a given graph. (Limit to polynomials with degrees 3 or less.)
Creating Equations	**The student will:**	
	A2.ACE.1*	Create and solve equations and inequalities in one variable that model real-world problems involving linear, quadratic, simple rational, and exponential relationships. Interpret the solutions and determine whether they are reasonable.
	A2.ACE.2*	Create equations in two or more variables to represent relationships between quantities. Graph the equations on coordinate axes using appropriate labels, units, and scales.
	A2.ACE.3	Use systems of equations and inequalities to represent constraints arising in real-world situations. Solve such systems using graphical and analytical methods, including linear programing. Interpret the solution within the context of the situation. (Limit to linear programming.)
	A2.ACE.4*	Solve literal equations and formulas for a specified variable including equations and formulas that arise in a variety of disciplines.
Reasoning with Equations and Inequalities	**The student will:**	
	A2.AREI.2*	Solve simple rational and radical equations in one variable and understand how extraneous solutions may arise.
	A2.AREI.4*	Solve mathematical and real-world problems involving quadratic equations in one variable. b. Solve quadratic equations by inspection, 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. *(Note: A2.AREI.4b is not a Graduation Standard.)*
	A2.AREI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. Understand that such systems may have zero, one, two, or infinitely many solutions. (Limit to linear equations and quadratic functions.)
	A2.AREI.11*	Solve an equation of the form $f(x) = g(x)$ graphically by identifying the x-coordinate(s) of the point(s) of intersection of the graphs of $y = f(x)$ and $y = g(x)$.

Structure and Expressions	**The student will:**	
	A2.ASE.1*	Interpret the meanings of coefficients, factors, terms, and expressions based on their real-world contexts. Interpret complicated expressions as being composed of simpler expressions.
	A2.ASE.2*	Analyze the structure of binomials, trinomials, and other polynomials in order to rewrite equivalent expressions.
	A2.ASE.3*	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. *(Note: A2.ASE.3b and 3c are not Graduation Standards.)* b. Determine the maximum or minimum value of a quadratic function by completing the square. c. Use the properties of exponents to transform expressions for exponential functions.
Building Functions	**The student will:**	
	A2.FBF.1*	Write a function that describes a relationship between two quantities. *(Note: IA.FBF.1a is not a Graduation Standard.)* a. Write a function that models a relationship between two quantities using both explicit expressions and a recursive process and by combining standard forms using addition, subtraction, multiplication and division to build new functions. b. Combine functions using the operations addition, subtraction, multiplication, and division to build new functions that describe the relationship between two quantities in mathematical and real-world situations.
	A2.FBF.2*	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
	A2.FBF.3*	Describe the effect of the transformations $kf(x)$, $f(x)+k$, $f(x+k)$, and combinations of such transformations on the graph of $y=f(x)$ for any real number k. Find the value of k given the graphs and write the equation of a transformed parent function given its graph.
Interpreting Functions	**The student will:**	
	A2.FIF.3*	Define functions recursively and recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
	A2.FIF.4*	Interpret key features of a function that models the relationship between two quantities when given in graphical or tabular form. Sketch the graph of a function from a verbal description showing key features. Key features include intercepts; intervals where the function is increasing, decreasing, constant, positive, or negative; relative maximums and minimums; symmetries; end behavior and periodicity.
	A2.FIF.5*	Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
	A2.FIF.6*	Given a function in graphical, symbolic, or tabular form, determine the average rate of change of the function over a specified interval. Interpret the meaning of the average rate of change in a given context.

	A2.FIF.7*	Graph functions from their symbolic representations. Indicate key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior and periodicity. Graph simple cases by hand and use technology for complicated cases.
	A2.FIF.8*	Translate between different but equivalent forms of a function equation to reveal and explain different properties of the function. *(Note: A2.FIF.8b is not a Graduation Standard.)* b. Interpret expressions for exponential functions by using the properties of exponents.
	A2.FIF.9*	Compare properties of two functions given in different representations such as algebraic, graphical, tabular, or verbal.
Linear, Quadratic, and Exponential	**The student will:**	
	A2.FLQE.1*	Distinguish between situations that can be modeled with linear functions or exponential functions by recognizing situations in which one quantity changes at a constant rate per unit interval as opposed to those in which a quantity changes by a constant percent rate per unit interval. *(Note: A2.FLQE.1b is not a Graduation Standard.)* b. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
	A2.FLQE.2*	Create symbolic representations of linear and exponential functions, including arithmetic and geometric sequences, given graphs, verbal descriptions, and tables.
	A2.FLQE.5*	Interpret the parameters in a linear or exponential function in terms of the context.
Complex Number System	**The student will:**	
	A2.NCNS.1*	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
	A2.NCNS.7*	Solve quadratic equations in one variable that have complex solutions.