Unpacked South Dakota State Mathematics Standards

Purpose: *In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*

Domain: Algebra	**Grade Level: Algebra 2**
A2.A.REI.B Cluster: Solve Equations and Inequalities in One Variable *Learners should determine a procedure for solving a quadratic equation that is convenient based on the form of the quadratic equation and recognize that some methods may produce complex solutions.*	
****This is a SUPPORTING cluster.** *Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.* **A2.A.REI.B.4 (ii)Select, justify and apply appropriate methods to solve quadratic equations in one variable. Recognize complex solutions and write them as *a* +/- *b*i for real numbers *a* and *b.***	
Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)	
A2.A.REI.B.4(ii) Select, justify and apply appropriate methods to solve quadratic equations in one variable. Recognize complex solutions and write them as *a* +/- *b*i for real numbers *a* and *b.*	

Conceptual Understanding	***Procedural Fluency***	***Application***
Learners will understand the process of solving quadratic equations presented in various forms and be able to justify which methods are more efficient to use depending on the form of the quadratic equation. Students will understand what a complex solution is as an answer (real vs. imaginary) and on a graph.	Learners will be able to solve quadratic equations using the following methods: ● Algebraically (ex: $x^2 = 20$) ● Factoring ● Completing the Square ● Quadratic formula ● Graphing calculator	Learners will be able to apply this knowledge of solving quadratics to real world situations (i.e. area models, when a thrown ball hits the ground, etc).

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
   - Students will be able to understand the difference between a real and imaginary part of a complex solution.
3. **Construct viable arguments and critique the reasoning of others.**
   - Students will be able to justify their reasoning for why one particular solution/pathway is more suited to a problem context than another.
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
   - Students will be able to recognize and solve a quadratic equation using reasoning that reduces problem solving steps (picking efficient methods to solve based on the original form given).
6. **Attend to precision.**

7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
In Algebra 1, students utilize a variety of methods to solve quadratic equations in terms of real solutions and justify why they used the method they did to solve.	*In this course, students will be introduced to complex solutions of quadratic equations. Students will relate this knowledge of solving quadratics to solving higher order polynomial equations and relating this to its graph.*	*In subsequent math courses (Pre-Calculus, AP Calculus, College Algebra, etc) students will relate this knowledge of quadratics and complex numbers to solving rational equations, trigonometric equations and trigonometric form.*

Vocabulary (key terms and definitions)

- Complex Numbers
- Imaginary Numbers

Relevance, Explanations, and Examples:

Achievement Level Descriptors

Cluster: Solve Equations and Inequalities in One Variable

Concepts and Procedures	***Level 1:*** Students should be able to solve one-step linear equations in one variable.
	Level 2: Students should be able to solve one-step linear inequalities and quadratic equations in one variable with integer roots.
	Level 3: Students should be able to solve multi-step linear equations and inequalities and quadratic equations in one variable with real roots.
	Level 4: Students should be able to solve quadratic equations in one variable with complex roots.