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: 4th Year**
HS4.A.REI.B Cluster: Solving Inequalities Students will solve inequalities algebraically and graphically.		
This is a MAJOR 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.* **A.REI.13** Solve linear, quadratic, polynomial, and rational inequalities in two variables algebraically and graphically.		
Aspects of Rigor of Student Learning: (Conceptual, Procedural, and/or Application)		
A.REI.13 Solve linear, quadratic, polynomial, and rational inequalities in two variables algebraically and graphically.		
Conceptual Understanding	***Procedural Fluency***	***Application***
Students explain how they determine which region is the solution to the inequality.	Students should be able to graph the equation (boundary) and then determine which region represents the solution set. Students should be able to solve inequalities algebraically.	
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.** 3. **Construct viable arguments and critique the reasoning of others.** ● Students explain why they chose a solution path and ask others to explain their methods. 4. **Model with mathematics.** 5. **Use appropriate tools strategically.** ● Students choose different methods to solve the problems including algebraically and graphically. 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***

Students will have solved linear inequalities both algebraically and graphically and systems of linear inequalities graphically (Algebra I).	In this course, students are working with inequalities and comparing solution techniques to solving equations. Students should be able to compare and contrast the benefits of solving inequalities graphically and algebraically.	Inequalities are used extensively in calculus, for example to find intervals of increasing, decreasing,or concavity.

Vocabulary (key terms and definitions)

- Critical values
- Interval
- Interval notation

Relevance, Explanations, and Examples:

To solve a non-linear inequality **algebraically**, it must be manipulated so that the expression is $<, \leq, >, or \geq$ zero. Then identify critical values by determining when the expression is zero or undefined. These values are then used to determine intervals. The intervals are then tested to determine which regions satisfy the inequality (+ or -).

$$\frac{2x-7}{x-5} \leq 3$$
$$\frac{2x-7}{x-5} - 3 \leq 0$$
$$\frac{-x+8}{x-5} \leq 0$$
$$Critical\ Values: x = 5\ and\ x = 8$$
$$Intervals: (-\infty, 5), (5, 8), (8, \infty)$$
$$negative, positive, negative$$
$$Solution: (-\infty, 5) \cup [8, \infty)$$