

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.A Cluster: Understand Solving Equations as a Process of Reason and Explain the Reasoning		
<i>This cluster builds on the framework of solving equations and extends it to rational and radical equations (and the knowledge of extraneous solutions).</i>		
<p>**This is a SUPPORTING cluster. (It's not major since this standard is specific to rational and radical equations.) 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.</p> <p>A2.A.REI.A.2 Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. Rational functions are limited to those whose numerators are of degree at most 1 and denominators of degree at most 2. Radical functions are limited to square roots or cube roots of at most quadratic polynomials.</p>		
Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)		
A2.A.REI.A.2 Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. <i>Rational functions are limited to those whose numerators are of degree at most 1 and denominators of degree at most 2. Radical functions are limited to square roots or cube roots of at most quadratic polynomials.</i>		
Conceptual Understanding	Procedural Fluency	Application
Learners understand the mathematical process in solving rational and radical equations. Students are able to identify extraneous solutions and explain why they are extraneous given the context of the problem.	Learners will solve radical and rational equations and determine extraneous solutions.	
Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices		
<ol style="list-style-type: none"> 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. <ul style="list-style-type: none"> Students explain in their own words why extraneous solutions arise. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. <ul style="list-style-type: none"> Students determine true solutions (not extraneous). 7. Look for and make use of structure. 		

- Students recognize the structure of doing and undoing as a part of solving equations and inequalities.
- 8. Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections

In Algebra 1, students solved linear and quadratic equations.

Current Learning Connections

In this course, students will extend their solving skills learned in Algebra 1 to rational and radical equations. Students will also relate the solving of other nonlinear equations learned in this course to solving rational and radical equations.

Future Learning Connections

In future math classes students will solve more challenging nonlinear equations, including trigonometric equations.

Vocabulary (key terms and definitions)

- Extraneous Solution
- Radical Equation
- Rational Equation

Relevance, Explanations, and Examples:

Achievement Level Descriptors

Cluster: Understand Solving Equations as a Process of Reason and Explain the Reasoning

Concepts and Procedures

Level 1: Students should be able to explain solution steps for solving one-step linear equations in one variable.

Level 2: Students should be able to look for and make use of structure to solve simple radical equations and simple rational equations in one variable in which the variable term is in the numerator and should understand the solution steps as a process of reasoning. They should be able to understand and explain solution steps for solving linear equations in one variable as a process of reasoning.

Level 3: Students should be able to look for and make use of structure to solve simple radical and rational equations in one variable presented in various forms. They should be able to understand and explain solution steps for solving quadratic, radical, and rational equations in one variable as a process of reasoning.

Level 4: Students should be able to give examples showing how extraneous solutions may arise and why they arise when solving linear, quadratic, radical, and rational equations.