

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: Reasoning With Equations and Inequalities		Grade Level: Algebra I
A1.REI.C Cluster: Solve systems of equations.		
Solve a system of equations by graphing, substitution, and/or elimination.		
<p>**This is a MAJOR cluster. <i>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.</i></p> <p>A1.REI.C.5. Understand the principles of the elimination method.</p> <p>A1.REI.C.6. Solve systems of linear equations exactly and approximately by graphing, focusing on pairs of linear equations in two variables.</p> <p>A1.REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.</p>		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
A1.REI.C.5. Understand the principles of the elimination method.		
Conceptual Understanding	Procedural Fluency	Application
Understand equations can be combined to eliminate a variable.		
A1.REI.C.6. Solve systems of linear equations exactly and approximately by graphing, focusing on pairs of linear equations in two variables.		
Conceptual Understanding	Procedural Fluency	Application
<p>Understand the solution to a system of linear equations represents the intersection point of the graph of the equations.</p> <p>Understand how to solve a system of linear equations by:</p> <ul style="list-style-type: none"> • Graphing • Substitution Method • Elimination Method <p>Understand a system of linear equations may have one, none, or infinitely many solutions.</p>	<p>Solve systems of equations by graphing and finding the intersection both by hand and using technology.</p> <p>Solve systems of equations using the substitution method.</p> <p>Solve systems of equations using the elimination (linear combination) method.</p>	

A1.REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Conceptual Understanding

Understand that the methods of solving linear systems can be applied to nonlinear systems.

Understand the intersection points of the graphs of the equations represents the solutions.

Understand the system consisting of a linear and a quadratic equation may have none, one, or two possible solutions.

Procedural Fluency

Solve a system of equations with a linear and quadratic equation by graphing.

Solve a system of equations with a linear and quadratic equation using substitution.

Application

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.**
 - Justify by convincing classmates why the graphing, elimination, or substitution method is the best method to solve a system of equations.
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
 - Utilize tools while graphing. Graph either by hand or with a calculator. Use calculator to verify algebraic solutions.
6. **Attend to precision.**
 - Graph the equations precisely to find the exact intersection of the system of equations.
7. **Look for and make use of structure.**
 - Recognize systems of equations that have no solution or infinitely many solutions.
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections

In middle school, learners:

1. solve systems of linear equations with a focus on graphing and substitution.

Current Learning Connections

In Algebra 1, learners:

1. create and solve a system of linear equations or inequalities in a real world context.

Future Learning Connections

In future math, learners:

1. use matrices to solve systems of linear equations
2. extend the knowledge of systems of equations in two variables to systems of equations in three variables.

Vocabulary (Key Terms Used by Teachers and Students in this Cluster):

- Substitution method
- Elimination method (linear combinations)
- System of equations

Relevance, Explanations, and Examples:

A.REI.C.7 will be challenging for students and should not be the focus of the cluster.

Achievement Level Descriptors

Cluster: Solve systems of equations.

Concepts and Procedures

Level 1: Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.

Level 2: The student who just enters Level 2 should be able to: Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. Use the necessary elements given in a problem situation to solve a problem. Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.

Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.

Level 3: The student who just enters Level 3 should be able to: Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.

Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.

Level 4: The student who just enters Level 4 should be able to: Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. Begin to solve problems optimally. Construct multiple plausible solutions and approaches.

Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.