

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: Expressions and Equations		Grade Level: 6
6.EE.C Cluster: Represent and analyze quantitative relationships between dependent and independent variables.		
The focus for this cluster is using variables to represent two quantities in a real-world problem that change in relationship to one another. Students write an equation and analyze the relationship between the dependent and independent variables using graphs and tables.		
<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>6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p>		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
<p>Determine independent and dependent variables and write an equation that represents the relationship of both. (6.EE.9)</p> <p>Recognize that a change in the independent variable creates a change in the dependent variable. e.g. as x increases y increases (6.EE.9)</p> <p>Identify relationships between variables using tables, graphs, and equations. (6.EE.9)</p>		<p>Represent two quantities that change in relationship with one another in real-world situations. (6.EE.9)</p>
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. <ul style="list-style-type: none"> • Look for meaning in the problems and find effective ways to represent and solve them. • Understand what the variable is represented in the problem in front of them stands for in order to make sense of the problem and solve for it. They will be able to explain what the variable represents and how their answer makes sense. 2. Reason abstractly and quantitatively. 		

- Reason with symbolic representations in equations.
 - Manipulate expressions while keeping equality.
3. **Construct viable arguments and critique the reasoning of others.**
 4. **Model with mathematics.**
 - Model real-life situations with mathematics and use variables to represent two quantities in real world contexts.
 - Model their situations using symbols, tables, and graphs.
 5. **Use appropriate tools strategically.**
 6. **Attend to precision.**
 - Use appropriate vocabulary and translate between verbal and numerical expressions fluently and accurately.
 - Set up expressions, equations, and/or inequalities that represent the correct interpretation of the problem at hand (e.g. $5 - y$ vs. $y - 5$).
 - State precisely the meaning of variables they use when setting up equations
 7. **Look for and make use of structure.**
 - Apply properties to generate equivalent expressions.
 - Use the structure of the properties to generate the expressions and will need to prove that their expressions are equivalent by using substitution.
 - Interpret the structure of an expression in terms of a context: if a runner is $7t$ miles from her starting point after t hours, what is the meaning of the 7 ?
 8. **Look for and express regularity in repeated reasoning.**
 - Look for regularity in a repeated calculation and express it with a general formula

Vertical and Horizontal Coherence and Learning Progressions

<u>Previous Learning Connections</u>	<u>Current Learning Connections</u>	<u>Future Learning Connections</u>
In Grade 5, learners are taught how to generate patterns from rules that are given to them.	<p>The students will expand their knowledge of 6.EE.7 in this cluster by continuing practice of writing equations in real-world situations.</p> <p>The students will expand their knowledge of 6.RP.3 by continuing to find relationships with numbers through rate reasoning.</p>	<p>The students will continue using dependent and independent variables and noticing patterns throughout the rest of their mathematical career, showing up mainly in the RP clusters and as they dive in to linear and non-linear relationships.</p> <p>In high school, they will be using this knowledge as they construct and compare linear, quadratic, and exponential models.</p>

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

- Independent Variable
- Dependent Variable
- Line graph
- Constant

Relevance, Explanations, and Examples:

This cluster is a foundational piece for future Ratio and Proportions and Functions work. The students need to conceptually understand the relationship between independent and dependent variables and how they appear in tables, graphs, and equations.

Task

Stephanie is helping her band collect money to fund a field trip. The band decided to sell boxes of chocolate bars. Each bar sells for \$1.50 and each box contains 20 bars. Below is a partial table of monies collected for different numbers of boxes sold.

Boxes Sold	Money Collected
b	m
1	\$30.00
2	
3	
4	
5	\$150.00
6	
7	
8	

- Complete the table above for values of m .
- Write an equation for the amount of money, m , that will be collected if b boxes of chocolate bars are sold. Which is the independent variable and which is the dependent variable?
- Graph the equation using the ordered pairs from the table above.
- Calculate how much money will be collected if 100 boxes of chocolate bars are sold.
- The band collected \$1530.00 from chocolate bar sales. How many boxes did they sell?

Task is taken from Illustrative Mathematics

Achievement Level Descriptors

Cluster: Represent and analyze quantitative relationships between dependent and independent variables.

Concepts and Procedures

Level 1: Students should be able to identify a table that represents a relationship between two variables of the forms $y = kx$ and $y = x \pm c$ with rational numbers and plot points corresponding to equations on coordinate planes.

Level 2: Students should be able to use variables to represent and analyze two quantities that change in relationship to each other of the form $y = kx$ or $y = x \pm c$ with rational numbers; identify and create an equation that expresses one quantity in terms of another; and use graphs and tables to represent the relationship.

Level 3: Students should be able to use graphs, tables, or context to analyze the relationship between dependent and independent variables and relate them to a linear equation.

	<p>Level 4: Students should be able to use graphs, tables, or context to analyze nonlinear polynomial relationships between dependent and independent variables and relate them to nonlinear polynomial equations.</p>
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